ADVANCE TOOLING AT GRUMMAN AIRCRAFT . . p 129

A SPECIAL REPORT

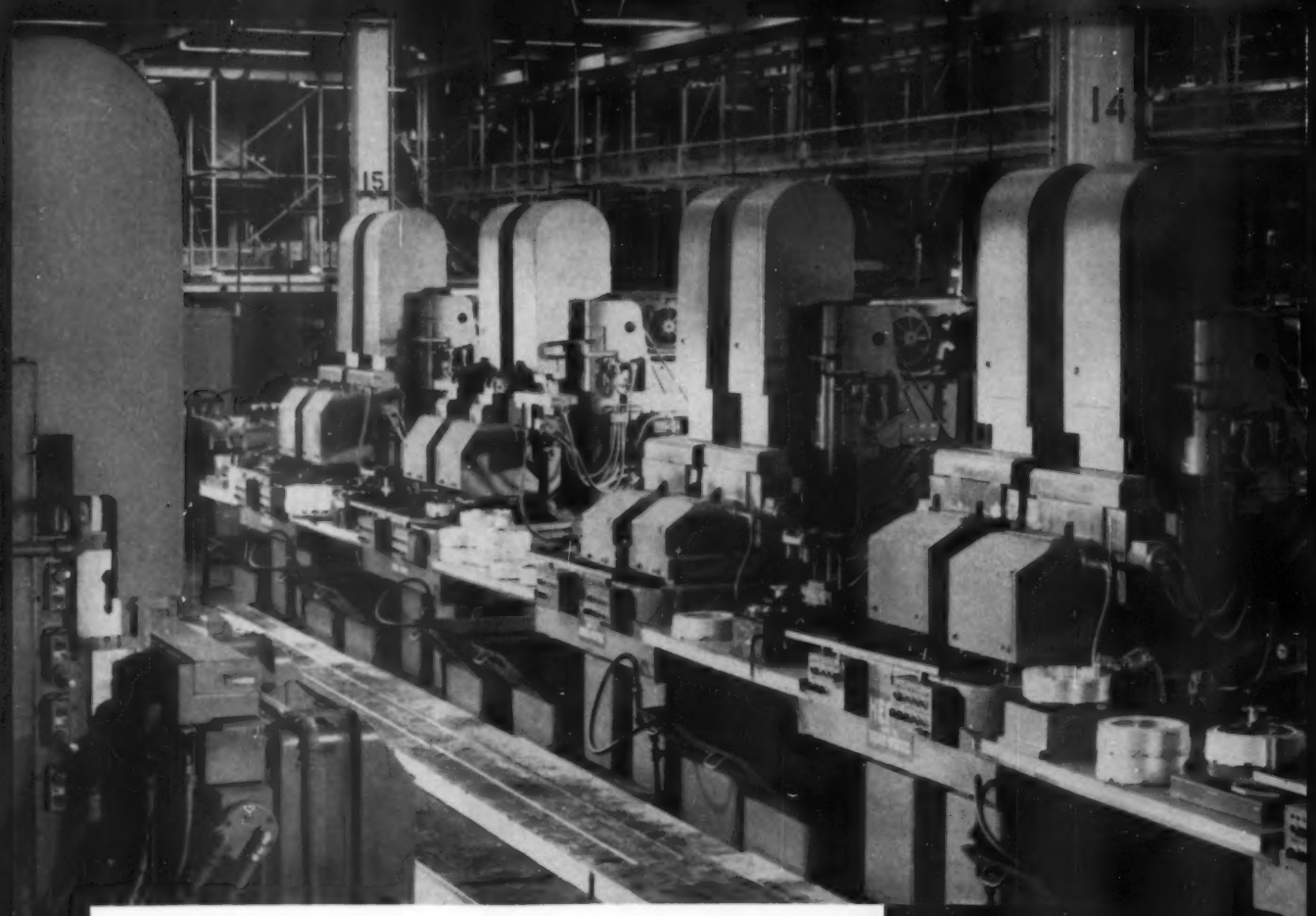
NEW CONCEPTS IN AUTOMATION OF STAMPING . . p 113

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

MARCH 11, 1957 PRICE 50 CENTS

Perimeter cams control router to machine Stratofortress bulkhead
—see page 2



Here's how

VERTICAL Bore-Matics

can save time and money on many precision-finishing jobs

LESS FLOOR SPACE These compact Vertical Bore-Matics save precious floor space, make use of more available up and down areas, permit operator to handle more than one machine.

EASIER LOADING Parts located down and onto the fixture, not up and into the workholding device. All stations are *front* stations – less reach and stretch.

IMPROVED CHIP AND COOLANT CONTROL Vertical units lend themselves naturally to gravity control of chips and coolant by means of simple, effective guarding.

CONTINUOUS PRODUCTION Independent operation of each station provides maximum opportunity to keep stations cycling continuously except for loading and unloading time.

THESE are just a few of the reasons why many types of work can be handled more efficiently and economically on a Heald Vertical Bore-Matic than on any other type of precision-finishing machine. For further details, send for Bulletin 2-352-1, Issue 1.

Ten Model 352 VERTICAL BORE-MATICS precision finish 5 different automatic transmission parts

Shown above is an installation of Heald Vertical Bore-Matics in a large automotive manufacturing plant. These space-saving machines are used for high-production Borizing of the following automatic transmission parts:

- Disc and Hub Assemblies
- First Turbine Convertors
- Convertor Pump Housings
- Turbine and Shaft Assemblies
- Second Turbine Convertors

Versatility of cycling and ease of tool changing makes these units readily adaptable to future job changeovers.

IT PAYS TO COME TO HEALD

HEALD

THE **HEALD** MACHINE COMPANY

Worcester 6, Massachusetts

Subsidiary of The Cincinnati Milling Machine Co.

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

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LWORKING PRODUCTION

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Let's straighten out this tool identification mess . . . A customer's recommendations on how better marking and common sense can simplify a major shop problem. **117**

How to design automatic stops . . . Step 9 in the series on how to design a die deals with trigger stops to register the strip at the final station. *By J R Paquin.* **120**

Now . . . cam-hydraulic system grinds burs automatically . . . a new machine duplicates manual operations to diamond-grind intricate contours in carbide burs; to speed output and improve quality. *By William M Stocker, Jr.* **126**

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SPECIAL REPORT NUMBER 440

Advanced tooling speeds Tiger production . . . Case studies from Grumman Aircraft show advanced methods of machining, tool designing, forming, assembly, honeycomb bonding, and descaling. *By John P. Wright and Gosta M Wernberg.* **129**

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Tolerances and limits, X, XI, XII . . . Concluding the series of illustrated definitions of tolerance for angularity, form, and position. **155**

American Machinist *Chips*

Cover . . .
Special machine at Temco machines the outside contour of a B-52 bulkhead. Further details are in the column at left.

Special Cam Miller . . . Accuracy plus is the objective of the machine shown on our cover this week. It was built by Temco Aircraft Corporation's Dallas plant to machine fuselage bulkheads for the Boeing B-52 Stratofortress. Outside contours of the welded steel and aluminum bulkhead are machined at one location and at one setting to the extremely close tolerances required by the contour of the airplane's outer skin. Varying degrees of depth, twist, and taper are machined into the aluminum pad faster and with more consistent accuracy than with conventional tracer machines requiring a great deal of hand work and many more separate operations. The tool utilizes a modified Quackenbush air-router motor, with depth, twist, and taper cuts controlled by two cams around the perimeter of the bulkhead-holding fixture.

Tiger Tooling . . . Because the building of supersonic planes poses such stiff problems, and the tooling that results contains so many ideas that turn out to work fine at the speeds required for more conventional metalworking, we have frequently turned the spotlight on these aircraft outposts. Way back in '54 (practically the supersonic Dark Ages), we had a Special Report on the production problems in this area that uncorked such new ideas as chemical milling, tape-controlled riveting, helical milling, and production machining of giant parts. In a steady stream of articles since then, we have kept you up-to-date on the new production ideas the aircraft industry was developing. These articles come right up to the Feb 25 issue this year, when we had two excellent, and broadly applicable, articles from Chance Vought in Texas.

This week we look at East Coast aircraft ideas. Two of our editors, John Wright and Gosta Wernberg, have been spending a lot of time at Grumman Aircraft Engineering Corp in Bethpage, LI, NY. With the wholehearted cooperation of the Manufacturing Engineering Div, they have collected some case studies that show advanced methods developed for the Navy's supersonic Tiger F11F-1F. The Manufacturing Engineering Division at Grumman, with Lynn Wheeler as assistant head of the division, is composed of the Tool and Methods Dept and the Equipment and Process Dept, and the data for these case studies came from these two departments. You'll find them in the Special Report starting on page 129.

14 Steps . . . J R Paquin's series on the steps in die design continues to be extremely popular with our readers. In this issue, Mr Paquin expands on Step 9, how to design automatic stops. You will find information on 17 sizes of automatic stops used to register the strip at the final die station. It starts on page 120.

Coming . . . AM for Mar 25 will feature a Special Report on honeycomb that will also uncork a lot of new ideas. You'll find articles on how to make a plant layout mathematically, on a way to cut gears with unground hobs, on an unusually flexible production line, and on gear deburring with die grinders. Plus all the usual departments.

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American Machinist is indexed regularly in the Engineering Index and the Industrial Arts Index

American Machinist, published bi-weekly, with an additional issue in mid-November, by McGraw-Hill Publishing Company, Inc, James H McGraw (1860-1948), Founder.
EXECUTIVE, EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: McGraw-Hill Building, 330 West 42nd Street, New York 36, NY. Donald C McGraw, President; Joseph A Gerardi, Vice President and Treasurer; John J Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B Smith, Vice President and Editorial Director; Joseph H Allen, Vice President and Director of Advertising Sales; A R Venezian, Vice President and Circulation Coordinator.
SUBSCRIPTIONS: Address correspondence to American Machinist-Subscription Service, 330 West 42nd Street, New York 36, NY. Allow one month for change of address. Subscriptions are solicited only from production executives and engineers in the metalworking industries. Position and company connection must be indicated on subscription orders.
Single copies, 50c. Subscription Rates—United States and possessions, $5 a year, $8 for two years, $10 for three years. Canada $7 for one year, $11 for two years, $14 for three years. Other Western Hemisphere and the Philippines, $15 for one year, $25 for two years, $30 for three years. All other countries $25 for one year, $40 for two years, $50 for three years. Second-class mail privileges authorized at New York, NY.
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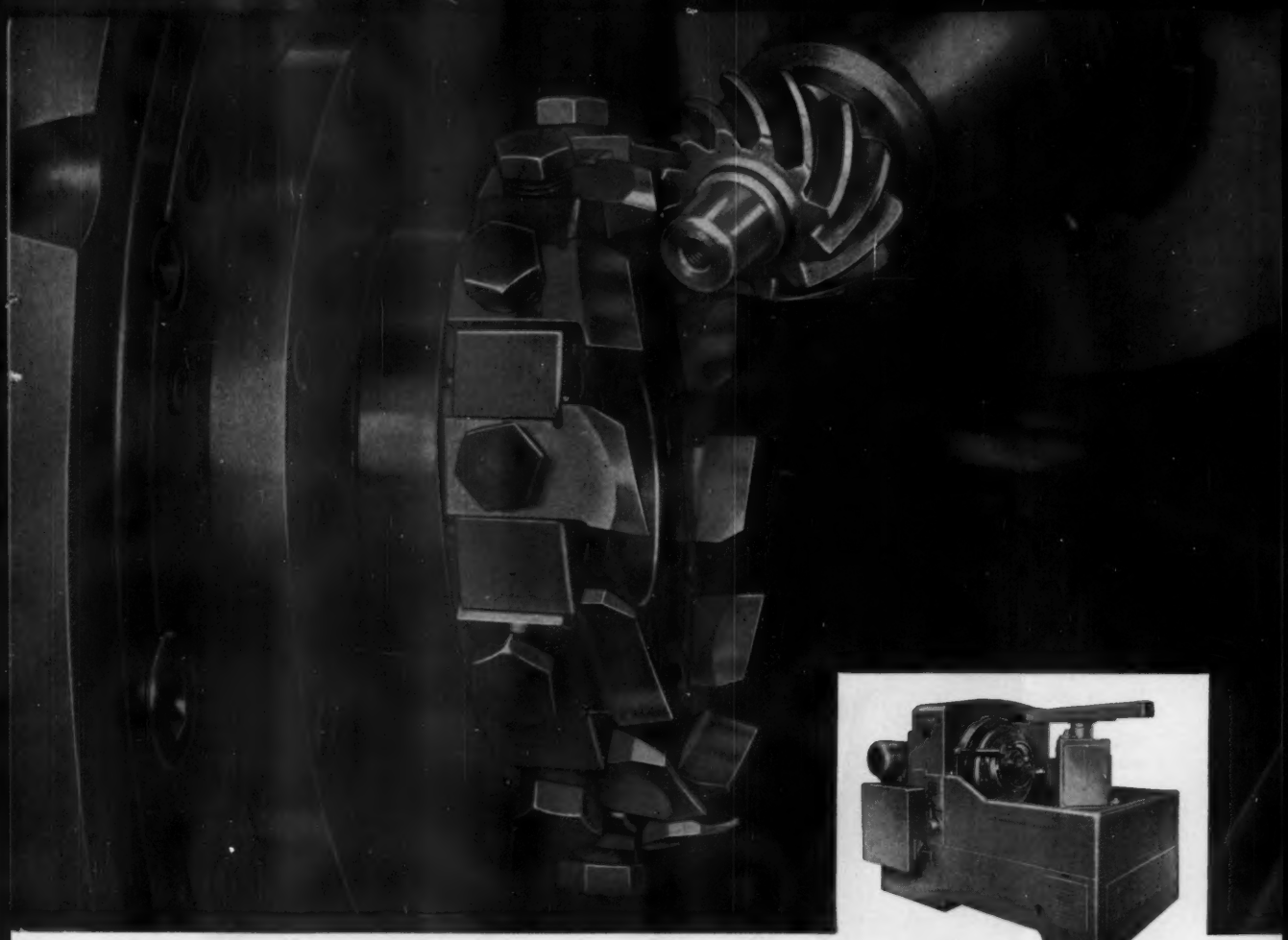
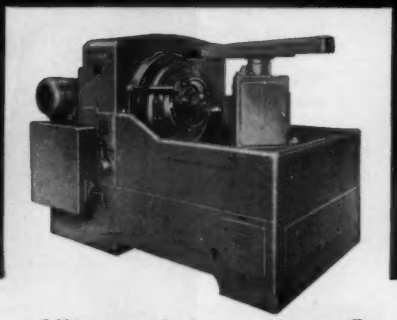




Jobbing or production quantities are efficiently handled with the new Gleason No. 106 Hypoid Generator.

This new generator cuts medium-size bevel gears *faster than ever!*

Several things have been done to make this new Gleason No. 106 Hypoid Generator the fastest machine for producing medium-size bevel gears.

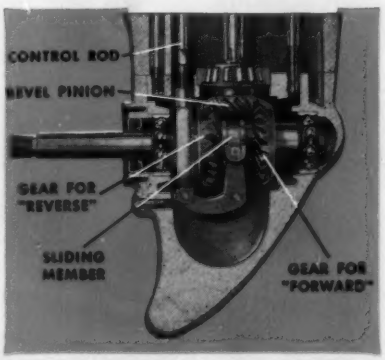
For example, new generating and feed mechanisms coupled with rigid construction give more efficient cutting cycles, speeding up cutting time. In addition, the new generating method assures excellent finish, and maximum cutter life.

Few adjustments required

Since fewer adjustments are necessary, faster setup and change-over are attained.

Extreme operating flexibility is one of the outstanding features of the 106. This permits its use for jobbing, production and completing. When it is arranged for completing, gears are finished directly from the solid blank.

This machine handles gears from 2″ to 8½″ diameter, 4DP and finer, with ratios up to 10/1, cone distances up to 5¼″. We will gladly send you more details on request.



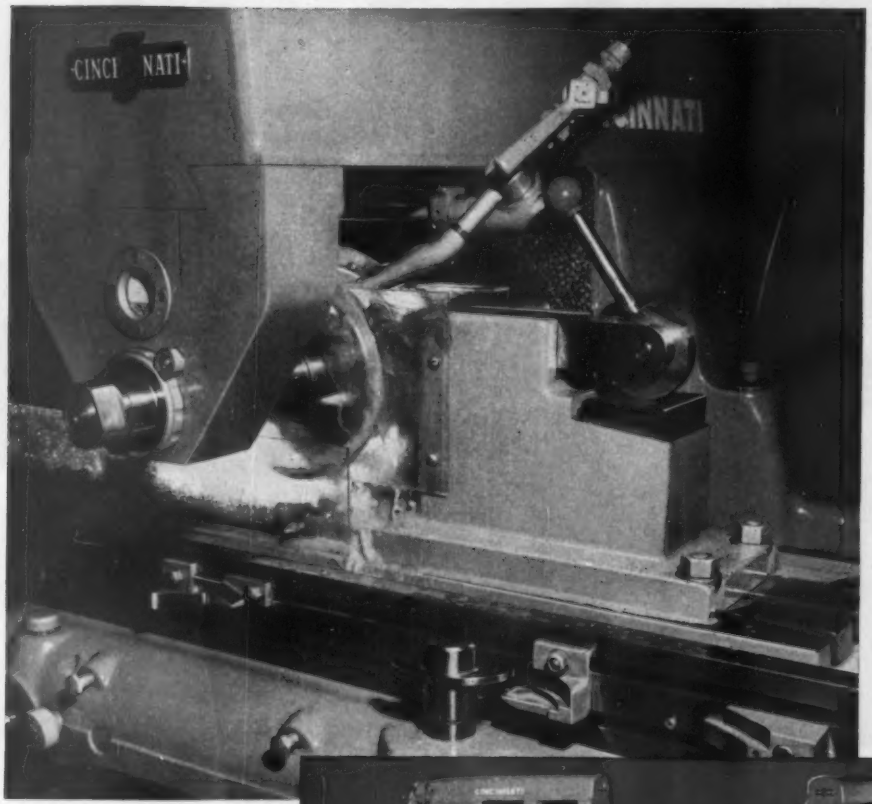
Spiral bevel gears similar to those in this outboard motor drive are cut accurately and quickly on this Gleason machine.

GLEASON WORKS

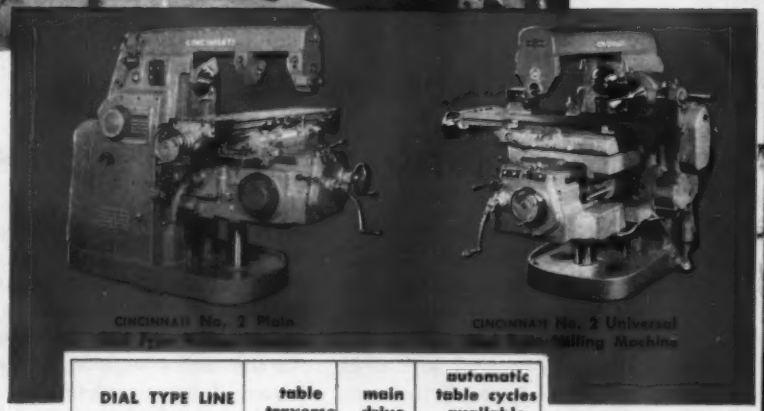
Builders of bevel gear machinery for over 90 years

1000 UNIVERSITY AVE., ROCHESTER 3, N. Y.

DIAL TYPES for



Automatic milling, using a simple one-way feed cycle, on a CINCINNATI No. 2 Plain Dial Type Milling Machine with Automatic Table Cycles



DIAL TYPE LINE		table traverse	main drive	automatic table cycles available
No. 2	Plain	28"	10 hp	yes
	Universal			no
	Vertical			yes
No. 3	Plain	34"	15 hp	yes
	Universal			no
	Vertical			yes
No. 4	Plain	42"	20 hp	yes
	Universal			no
	Vertical			yes

CINCINNATI

MILLING MACHINES • BROACHING MACHINES • CUTTER AND TOOL GRINDERS • METAL FORMING MACHINES

Automatic Milling

For widely varying manufacturing quantities, Dial Types with automatic table cycles are ace high in keeping costs down. By merely setting the dogs at the front of the table, any feed and rapid traverse combination of the three basic cycles is obtainable: feed right; feed left; alternately left and right, continuously or with center safety stop. Of course, standard features of versatility are retained in these machines. Available in Nos. 2, 3 and 4 sizes; plain and vertical styles.

DIAL TYPES for Toolroom Milling

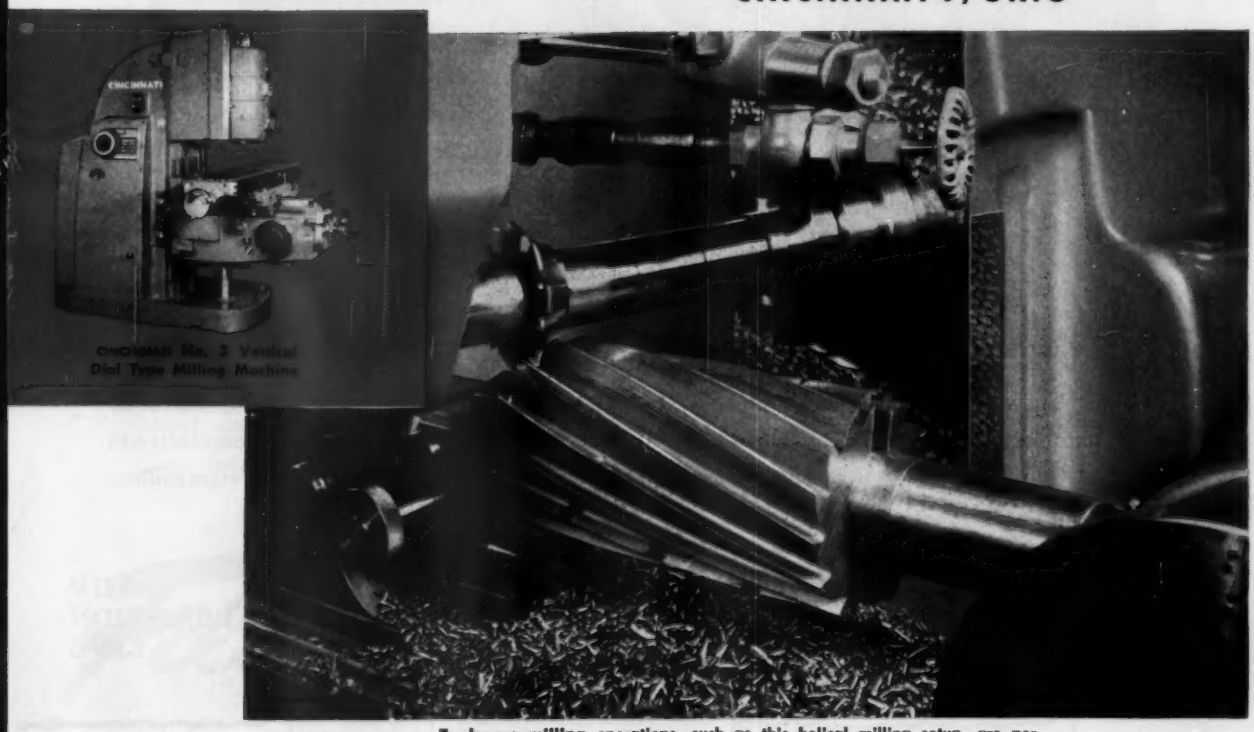
CINCINNATI

For uniformly low manufacturing quantities, Dial Types with conventional table cycles will be your first choice. They are available in Nos. 2, 3 and 4 sizes; plain, universal and vertical styles; standard (2½" to 100") or short lead (.010" to 1000") range for the universal machines. ¶ Compare CINCINNATI® Dial Type Milling Machines with any other in the 10 to 20 hp classification. In no other machine will you find advantages such as:

Dynapoise overarm . . . push-button spindle speed selection . . . 24 spindle speeds, 100 to 1 ratio . . . 32 feeds, 3/8" to 90" per minute . . . automatic disengagement of all hand cranks . . . 150" per minute power rapid traverse.

A complete list of Dial Type advantages and specifications is contained in catalog No. M-1915-2. May we send a copy to you? Brief specifications will be found in Sweet's.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



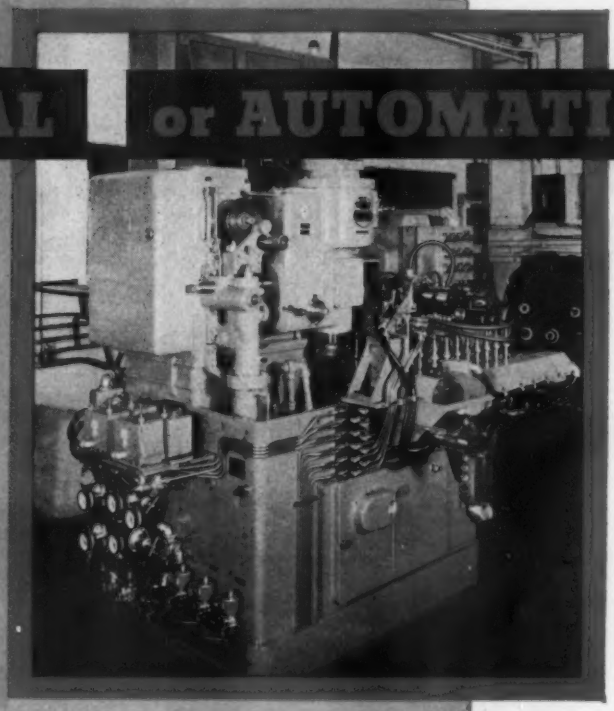
CINCINNATI No. 3 Vertical Dial Type Milling Machine

Toolroom milling operations, such as this helical milling setup, are performed at exceptionally low cost on CINCINNATI Dial Type Milling Machines

HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID • GRINDING WHEELS

VERSATILE

MANUAL or AUTOMATIC



Practically any shaped part in its size range can be cut faster and more accurately on a Fellows No. 4GS Gear Shaper . . . with either manual, semi-automatic or full-automatic operation, depending on your needs!

This production flexibility makes the powerful "4GS" ideal for long runs on similar parts or for short runs of varied jobs. Set-ups are easy and fast. Internal or external spur and helical gears, as well as splines, cams and other irregular non-involute shapes up to 6" P.D. and 2" face width can be cut on this machine. Nine cutter speeds range from 98 to 635 strokes per minute.

The versatility of Fellows No. 4GS Gear Shaper, with manual operation or any degree of automation, can very probably lower *your* cutting costs. Ask your Fellows Representative to show you facts and figures. Write, wire or phone any Fellows office.

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
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1048 North Woodward Ave., Royal Oak, Mich.
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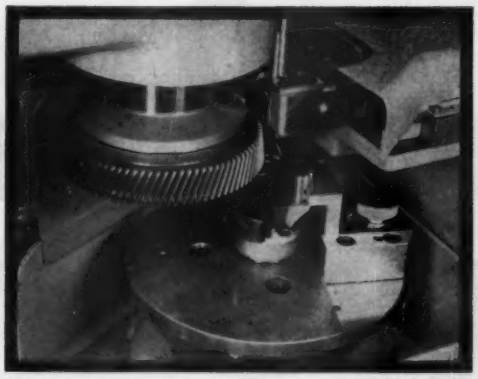
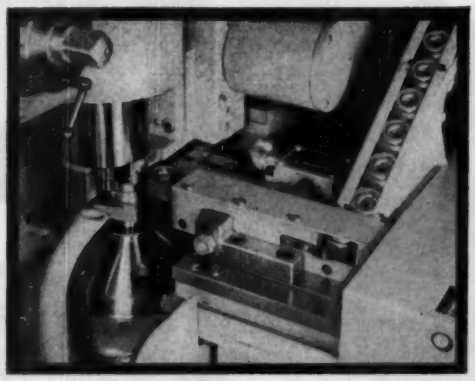
THE PRECISION LINE

FELLOWS "4GS"

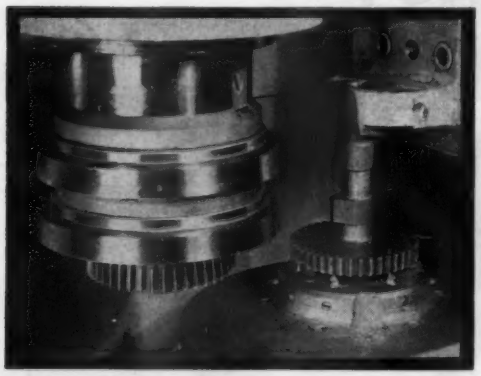
...or anything in between!



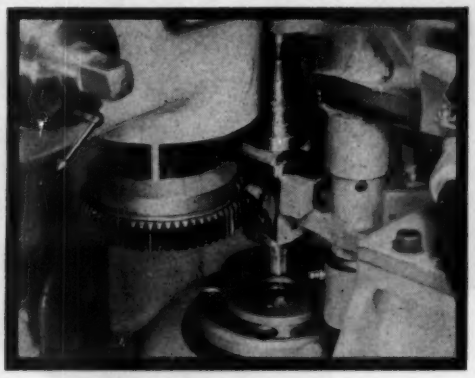
Helical gear cut on a motor crankshaft. Operation can be manual or semi-automatic. Part is held in a bushing at the bottom, an air operated split sleeve support at the top and driven from the connecting rod bearing surface.



Internal clutch parts produced with fully automatic loading and unloading. Part is transferred from loading chute to air operated expanding arbor and teeth are cut. Part is then removed from arbor and transferred to unloading chute while another blank is being loaded.



Two cams and a gear are cut at the same time on this gasoline motor part. Cutters are used in tandem and are keyed together to give the required relation between the positions of the cams and the teeth of the concentric gear. Operation is manual.



Automotive transmission cluster gear shaft handled automatically. Air operated "fingers" move shaft into position for automatic chucking and then place finished part in unloading conveyor.

Fellows *Gear Production Equipment*

why buy 2 when

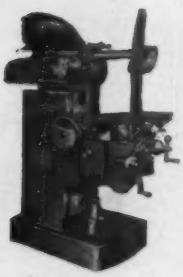
No. 16S — The most versatile miller available — features the quill type adjustable cutterhead that permits horizontal, angular and vertical milling plus boring and drilling. Table: 40½" x 10"; Quill Travel: 4"; Quill Power Feeds: .0015; .003; .006; Cutterhead Spindle Motor: 2 HP; Speeds: 110 to 3600.

VAN NORMAN MACHINE

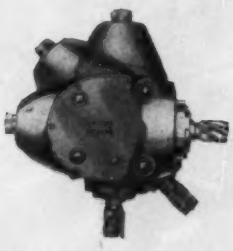
MANUFACTURERS OF — Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

ONE will do... when it's a VAN NORMAN Ram type miller

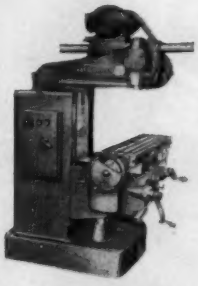
A single investment in ONE Van Norman ram type miller gives you the equivalent of two single purpose machines plus attachments. And at a much lower cost.



No. 16M — a heavy duty miller designed for maximum rigidity and accuracy. Table: 40½" x 10"; Ram Travel: 20½"; 3 HP Cutterhead Spindle Motor; Speeds: 50 to 2000.



This adjustable cutterhead, on the Van Norman 16L & 16M, gives you two millers in one. It enables you to do horizontal, angular or vertical milling, minimizes work reset-ups, cuts idle machine time and tooling costs.



No. 16L — designed to increase production and cut costs in toolrooms, machine shops, pattern shops and on production lines. Table: 40½" x 10"; Ram Travel: 20½"; Cutterhead Motor: 2 HP; Speeds 84 to 2760.

Get complete details on the Van Norman 16S, 16L, and 16M today. Write, wire or telephone for catalog.

COMPANY

SPRINGFIELD 7, MASSACHUSETTS

Don't wait . . . for extra profit install a Van Norman machine now! They are available on several purchase plans . . . Outright sale . . . On conditional sales contract up to five years . . . Pay as you depreciate up to 10 years. Conditional Sales Contracts not available to Export.

AUTOMATIC THREADING

to close tolerances on single-spindle automatic

Automatic opening and closing and *ability to meet exacting concentricity requirements* were the principal reasons a LANDIS Die Head was selected to thread drive wheel cap screws for industrial lift trucks manufactured at the Yale Materials Handling Division of The Yale and Towne Mfg. Co. in Philadelphia, Pa.

5/8", 11-pitch UNC threads are cut 7/8" long on 3140 steel by a LANDMATIC Head on a Cleveland Single-Spindle Screw Machine. Threads must meet Class 3 tolerances—in addition, the threads must be concentric with the screw body within .002".

A 1-1/4" FD LANDMATIC Head is being used for this work—a stationary, self-opening head arranged for automatic closing. A special over-travel feature eliminates the necessity of a complicated, accurately-set closing cam on the machine. Threads are produced to necessary tolerances at 18 SFM, with 400 pieces completed between chaser grinds.

This head, other than the over-travel feature, is a standard LANDMATIC Heat-Treated Head (primarily used for turret lathe threading) equipped with standard LANDIS Tangential Chasers. Even with this tough material, close tolerances are met with an excellent number of pieces between grinds. Further economies are realized as the chasers with regrinding will produce these threads for 80% of their original length. Wide range and oversize capacity are important features of the head—1/4" to 1-1/4" normal range, short thread lengths up to 2-3/4" in diameter with oversize chaser holders.

A wide variety of sizes and types of LANDIS Heads allow you to gain the utmost "threading efficiency". Send us your specifications and ask for Bulletins F–80 and F–90—let us suggest the LANDIS Head most suitable for your needs.

LANDIS Machine COMPANY

WAYNESBORO • PENNSYLVANIA • U. S. A.

Exclusive features make Landis universal grinders a "best buy"

Here's where they will save time... reduce grinding costs:

Tool Rooms
Jobbing Machine Shops
Maintenance Shops
Tool and Die Shops
Training Shops
For short production runs
For small precision parts

Landis 10" x 20" Type H Precision Universal Grinder

LANDIS
precision grinders

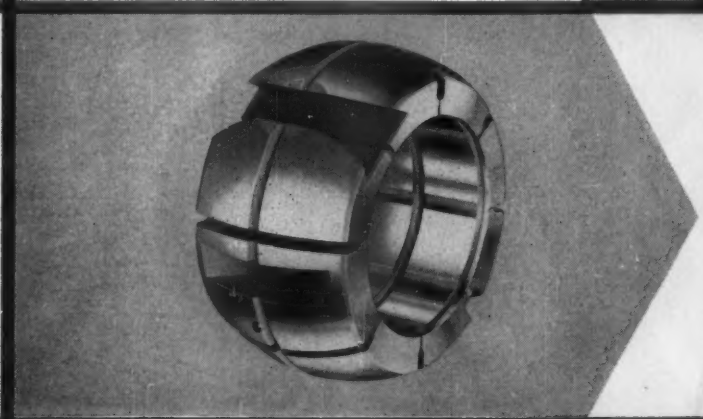
LANDIS TOOL COMPANY / WAYNESBORO, PENNSYLVANIA

Fully universal wheelhead for fast setup

Easy hand swiveling with exclusive Landis wheelhead swivel mechanism.

Swinging internal grinding fixture for fast *change* of setup

Quickly lowers for internal grinding; locks securely and rigidly; swings up out of the way; no exposed belts.



Microsphere bearings for close tolerances and fine finishes

Closest running clearance of any spindle bearing; gives sensitive response to wheel feed, quick sparkout, dependable operation.

Fully universal headstock for ease of operation

Compact, low design; only two revolving parts. Variable speed control by rheostat. Swivels for angle or face grinding.

Giddings & Lewis

MODEL

350-T

precision horizontal boring, drilling and milling machine

LITERATURE AVAILABLE:
For complete specifications on Models 350-T and 340-T horizontal boring, drilling and milling machines, write for Bulletin No. 30-T.

Any large or small manufacturing plant can profitably own a G&L 30 Series table-type horizontal bar. Here's a machine that enables you to perform a variety of precision work at higher productive capacity and at lower cost than any other machine on the market.

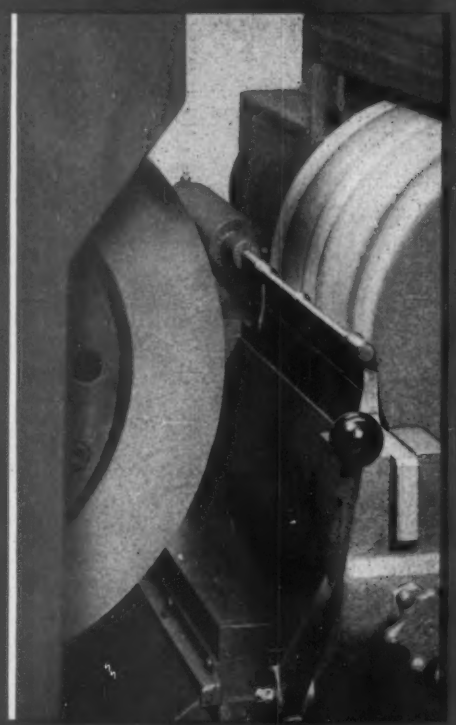
Two popular horizontals in the 30 Series line are the Model 350-T with 5" dia. spindle (25 hp) and Model 340-T with 4" dia. spindle (20 hp). Other horizontal boring machines are offered in spindle diameters ranging from 3" to 14". . . main motor drives 10-150 hp.

For more information on G&L's complete line of horizontals and their many profit-making accessories and attachments — built-in rotary tables, electric automatic positioning device, etc. — contact your nearest G&L representative or write direct.

G & L *and* HYPRO DIVISION
GIDDINGS & LEWIS MACHINE TOOL CO.
FOND DU LAC, WISCONSIN G-69

Builders of the world's finest heavy-duty Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; HYPRO Double Housing and Openside Planers; Planer-Type Milling Machines; Vertical Boring Mills; Spar and Skin Milling Machines, and VARIAX Milling Machines.

Cincinnati Filmatic



1 Multiple diameter studs 15" long are precision centerless ground their entire length, including several radii, on this CINCINNATI FILMATIC No. 3

2 In this setup, 4, 5 or 6 diameters, within overall lengths of 16½", are infeed ground on stainless steel bolts

3 17½" wide grinding wheel, removed from a CINCINNATI FILMATIC No. 3 Centerless to show the wheel profile for grinding the entire length of textile spindles

CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • ROLL GRINDING MACHINES • SURFACE

Nos. 0 2 3 4 5 6 Centerless

The No. 3 is the machine for this type of work ...infeed grinding entire 20" length of slender parts

FILMATIC

Tough precision grinding jobs look easy and cost less when assigned to CINCINNATI® FILMATIC No. 3 Centerless Grinders. Take slender multiple diameter parts up to 20" long, for example. These parts can be infeed ground their entire length on the No. 3. Tooling usually incorporates automatic cycling equipment, operating at remarkably rapid rates.

Three examples on the opposite page show how some manufacturers are grinding the entire length or several diameters of long parts in one infeed cycle.

CINCINNATI FILMATIC No. 3 Centerless Grinders are designed to perform a variety of centerless grinding operations in addition to the severe test of performance outlined above.

Fixed bedrock mounting of the grinding wheel spindle is tops for removing metal rapidly

FILMATIC grinding wheel spindle bearings require no maintenance during the life of the machine

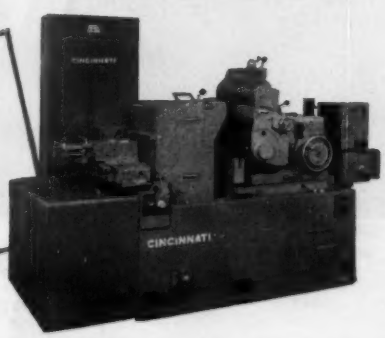
Preloaded precision regulating wheel slide improves exactness of sizing adjustments; eliminates scoring

Infinitely variable regulating wheel speeds, 10 to 320 rpm

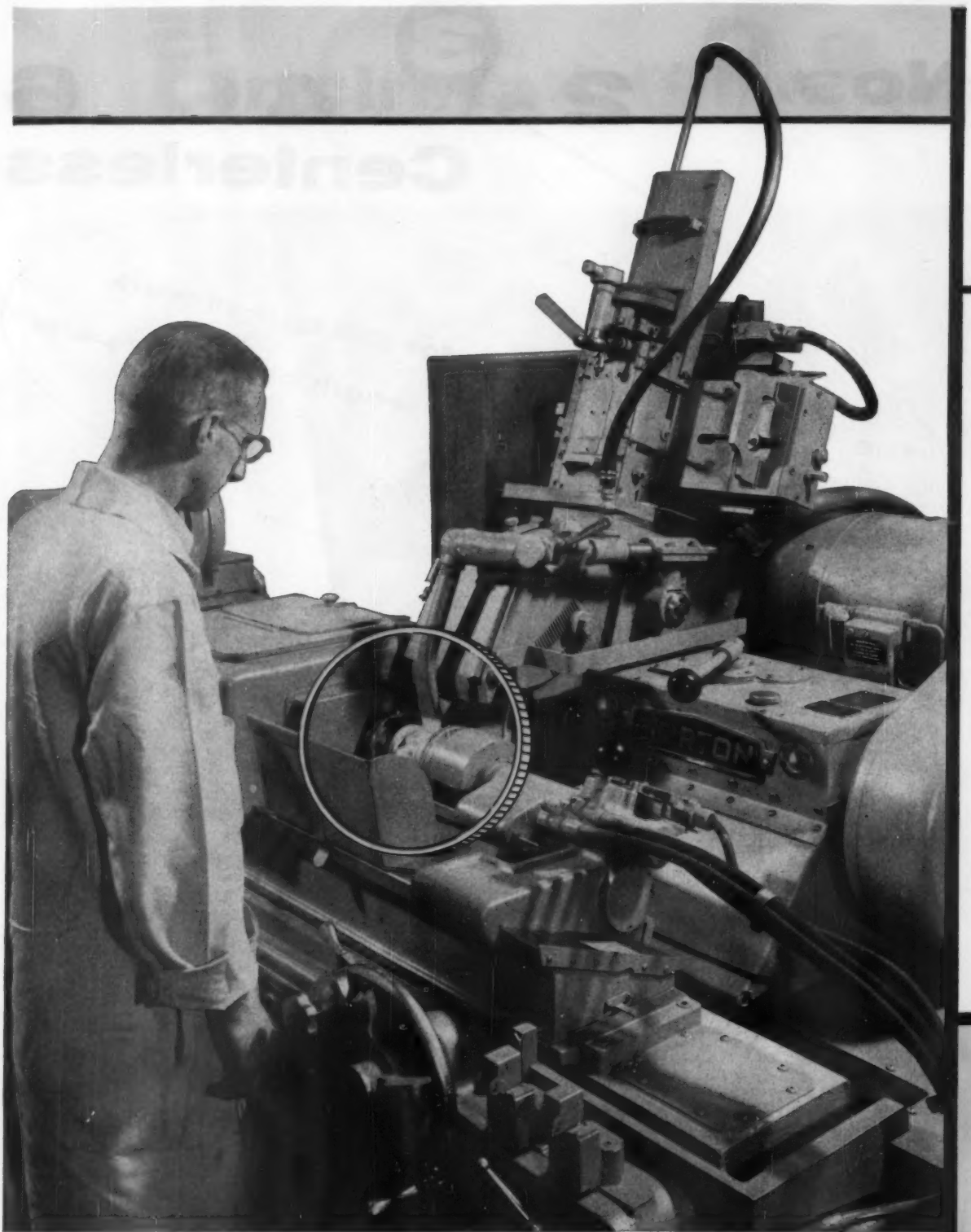
Many additional features and their relation to the proved dependability and productive capacity of CINCINNATI FILMATIC No. 3 Centerless Grinders are outlined in catalog No. G-664-1. Ask for a copy today. You will find brief data on the entire Cincinnati Centerless line in Sweet's Machine Tool File.

CINCINNATI GRINDERS INCORPORATED • CINCINNATI 9, OHIO

CINCINNATI FILMATIC
No. 3 CENTERLESS
GRINDING MACHINE
CATALOG No. G-664-1



GRINDING MACHINES • CHUCKING GRINDERS • MICRO-CENTRIC GRINDING MACHINES • CENTERLESS LAPPING MACHINES



DESIGNED FOR HEAVY DUTY, HIGH PRODUCTION SERVICE, the Norton 6" x 8" Semiautomatic Piston Grinder produces standard automotive and other types of pistons. Its high speed, accuracy and economical operation add the "Touch of Gold" that produces more pistons and lowers your costs.

Here's why you can grind pistons better for less money

with the Norton 6" x 8" semiautomatic piston grinding machine

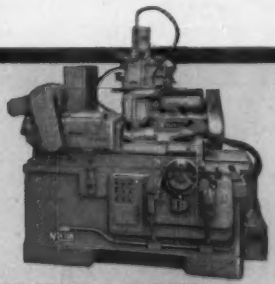
Fast automatic sizing is just one important advantage of the Norton 6" x 8" Piston Grinder. This is assured by the repetitive accuracy of the easily adjustable "micrometric-type" revolving screw wheel feed mechanism — *plus* the heavy wheel spindle unit that resists wheel pressures — *plus* the rugged cam generating mechanism that provides enduring accuracy of the motion required for piston skirt form. And this rapid action is built-in for the life of the machine, thanks to massive proportions and generous wear surfaces.

Other High Production Advantages

- *Simplified Operation* that reduces operator fatigue through convenient location of controls. The operator can make all adjustments for feeds and speeds without leaving his normal position.
- *Automatic Functioning* that operates at a pre-determined pace, hour after hour, minimizing effort and increasing production through elimination of lag due to operator fatigue.
- *Automatic Grinding Cycle,* operating under electrically timed control and adjustable over a wide range. Starting at the touch of a single lever, the grinding cycle terminates at the pre-set time, ready for removal of the work. (Rotation of the work may be stopped automatically, in the most convenient unloading position, by an optional "electric-eye" arrangement.)
- *Automatic Wheel Truing.* Merely touching a push-button sends the wheel head mounted automatic truing device on a round trip across the wheel face at pre-determined speed and feed. This not only lessens the time and skill usually required for truing, but gives closer control of the amount of abrasive removed, thus reducing the wheel cost per piece ground.

Get the Whole Story

on how the Norton 6" x 8" Semiautomatic Piston Grinding Machine can benefit your production. See your Norton Representative, or write direct for Catalog No. 742. And remember: only Norton offers you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost. NORTON COMPANY, Worcester 6, Massachusetts.



IDEAL FOR AUTOMATIC LOADING. Already greatly simplified in operation, and with many automatic features, this advanced grinder is readily adaptable for automatic loading and unloading. Also, it is available under the Norton Lease and Purchase Financing Plans, which enable you to modernize while conserving your capital. Full particulars on request.

To Economize, Modernize with **NEW**

NORTON

GRINDERS and LAPPERS

Making better products...to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels
Grinding Machines • Refractories

BEHR-MANNING PRODUCTS: Coated Abrasives
Sharpening Stones • Behr-cat Tapes

District Offices: Worcester • Hartford • New York Area, Teterboro, New Jersey • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5.

ACCO Registered* Wire Rope Slings

Only Cable Laid Slings Give You This Flexibility

• Cable Laid Slings are really different. These specialized slings combine the flexibility of manila rope with the strength of steel. And to this extreme flexibility they add freedom from crankiness and resistance to kinking. The result is a sling which handles easier—saves time—cuts operating costs.

The secret of cable laid slings is in the construction of the wire rope. It is a combination of six individual wire ropes, not strands, laid around a special steel center. These ropes are coated with a special GALACCO coating for maximum corrosion resistance. And ACCO's patented DUALOC endings give extra strength and safety to the finished sling.

SAFEST SLINGS MADE. ACCO cable laid slings, like all of the other slings in ACCO's complete selection, are registered—incorporate extra safeguards, which make them the safest slings made.

Each individual component, made from the highest quality material suited to its use, is tested before assembly—must prove to have strength equal to or greater than the sling body. These components are then assembled into slings according to precisely-engineered designs which have proven their safety and reliability in extensive field tests.

Each completed sling is then proof-tested at twice the load-carrying capacity for which it is rated. Then, and only then, does it receive the coveted registration certificate and tag.

Get the details on Cable Laid, or any other ACCO *Registered* Wire Rope Slings, from your distributor—or call the nearest ACCO district branch below.

FREE FOLDER: Write the Wilkes-Barre office for your copy of new folder **DH-532** which gives details on ACCO *Registered* Cable-Laid Slings.

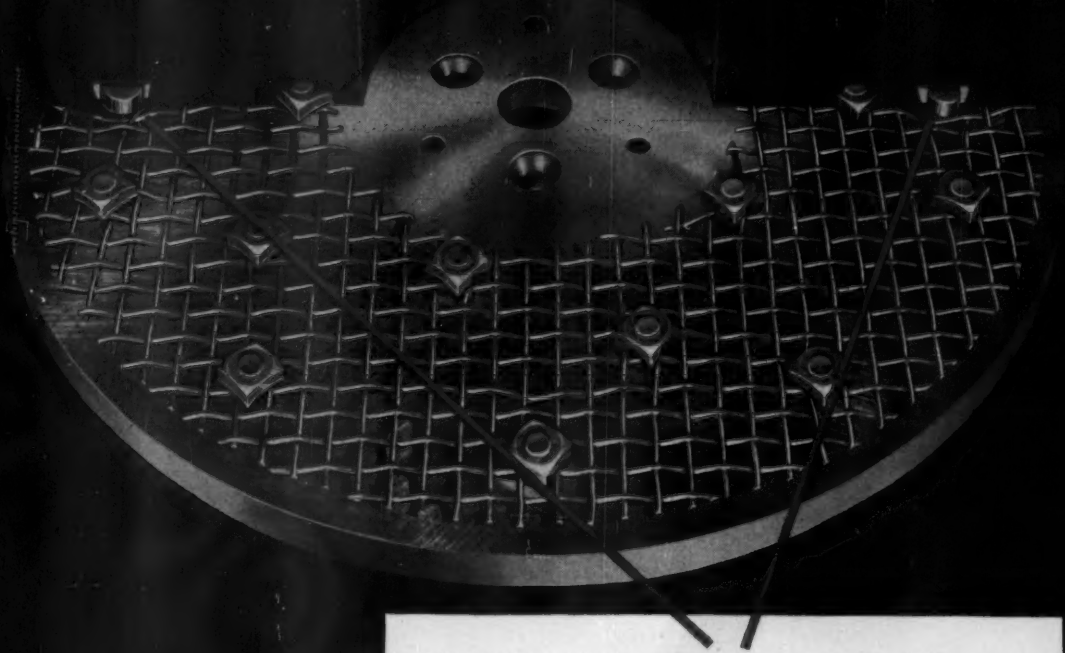
*Trade Mark Registered

ACCO

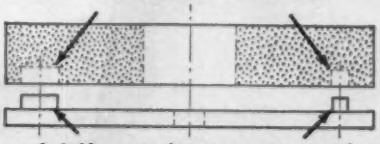
Wire Rope Sling Department, American Chain & Cable Company, Inc.

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn. In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

Improved Gardner TRU-LOK® assures precision disc mounting for truer running



Molded, rigid plastic inserts in dowel holes now provide greater accuracy in mounting.



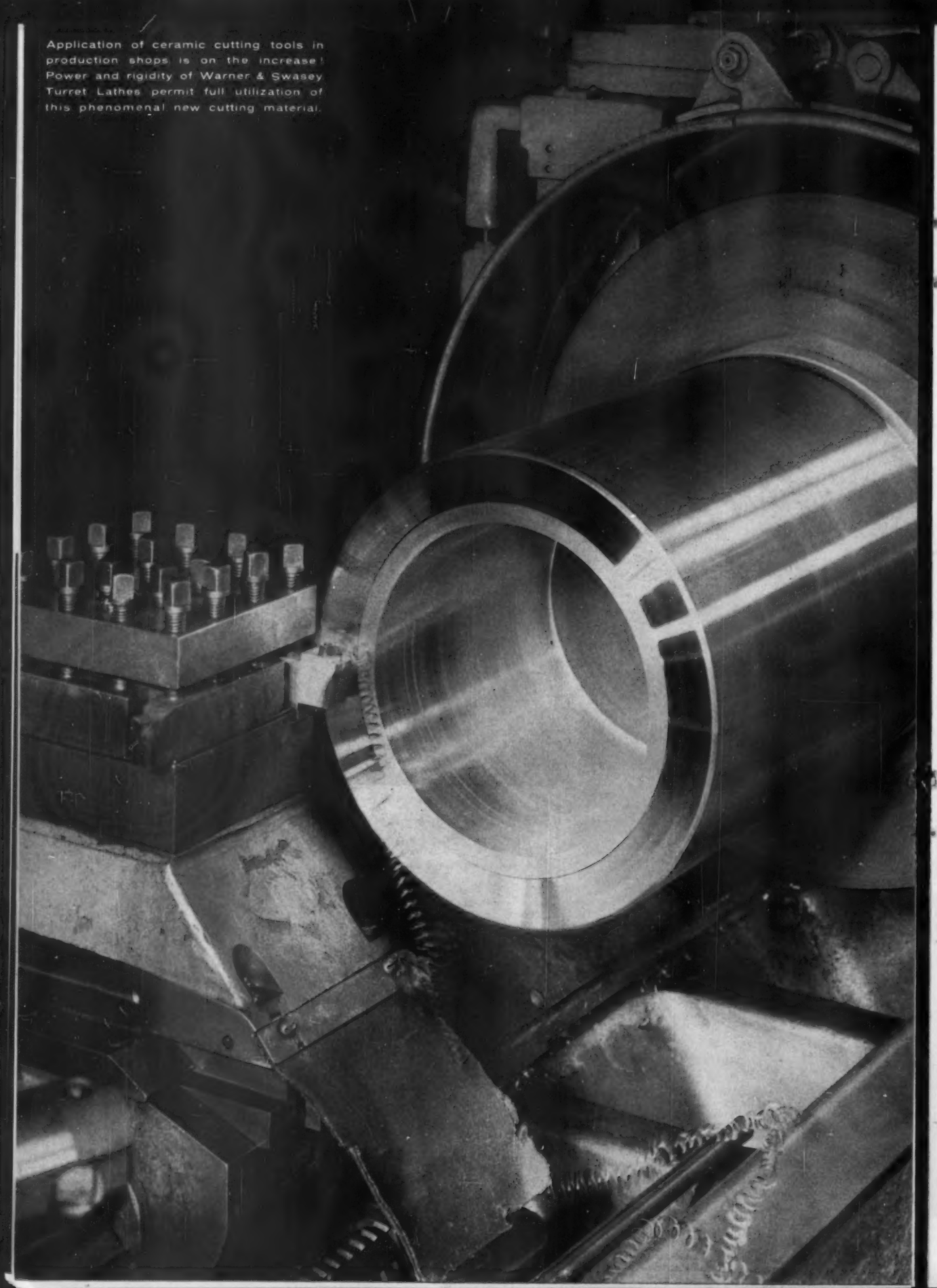
Dowel pins of different diameter in steel wheel must match holes in disc.

Gardner TRU-LOK eliminates run-out and vibration caused by off-center mounting. Disc can be bolted to steel wheel only in position established at time of disc manufacture.

GARDNER

abrasive discs

BELOIT, WISCONSIN



Application of ceramic cutting tools in production shops is on the increase! Power and rigidity of Warner & Swasey Turret Lathes permit full utilization of this phenomenal new cutting material.

Warner & Swasey's continuing Metalcutting Research Program is helping to find...

what Ceramic Tooling can mean to you!

Evaluation of today's new and revolutionary ceramic cutting tools is but another step in Warner & Swasey's ever-continuing metalcutting research program. Only through such constant engineering investigation, study and testing can answers be found to your ever-present question, "How can we machine it better, faster, for less?".

Highlighting the American Society of Tool Engineers' Silver Anniversary meeting at Houston, Texas, March 25 through 27, will be a CERAMIC TOOLING SYMPOSIUM of which Warner & Swasey is proud to be a co-sponsor together with the Massachusetts Institute of Technology and Ohio State University.

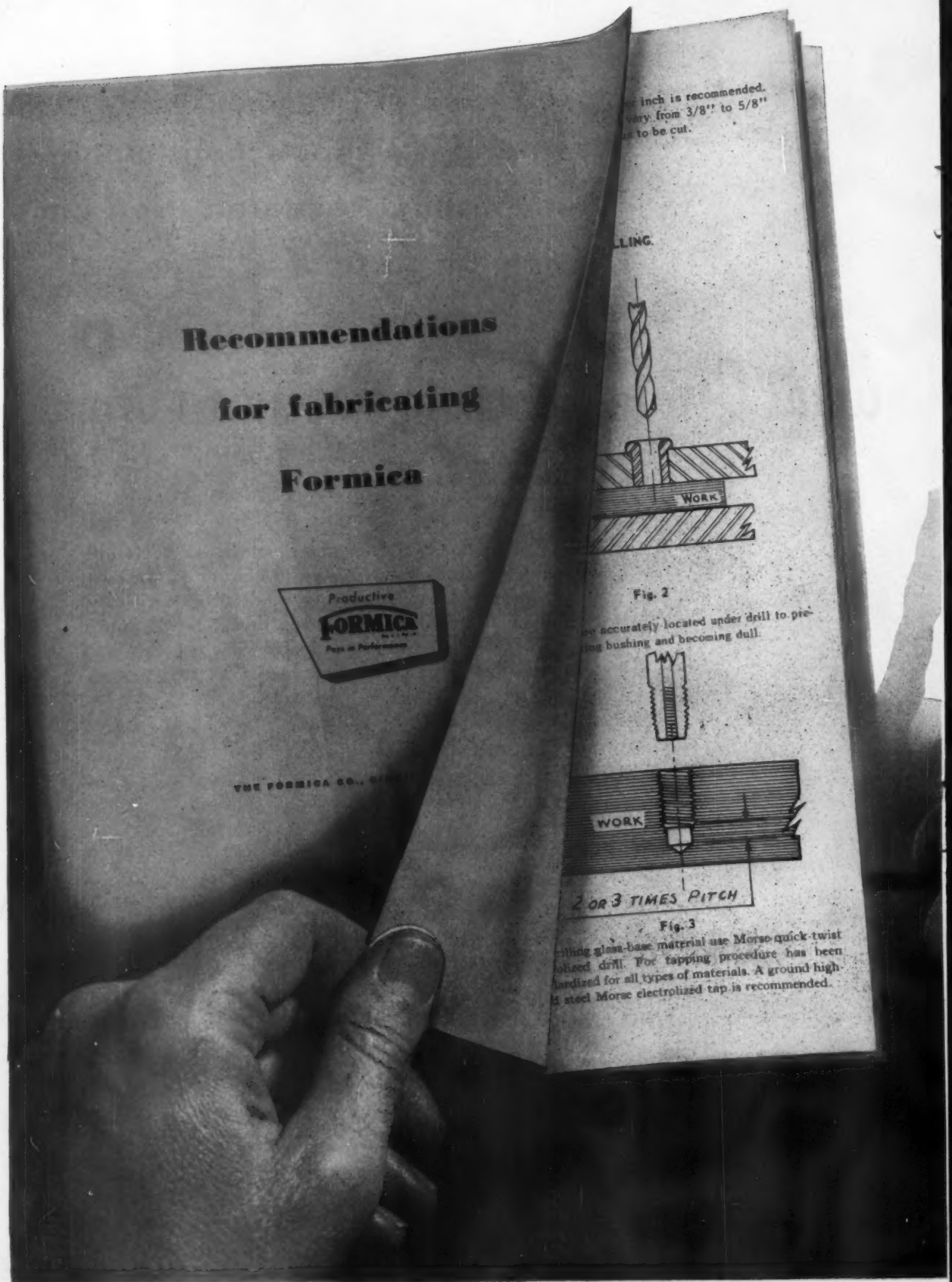
A display of ceramic tools and specially-adapted equipment will be featured along with the presentation of technical papers covering ceramic tooling's historical background, laboratory findings and the practical advantages and disadvantages of industrial applications.

A panel discussion by leading authorities will answer your specific questions regarding the potential application of ceramic cutters in your own shop.

We are looking forward to seeing you in Houston!

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880


Recommendations
for fabricating
Formica
Productive
FORMICA
Pays in Performance
THE FORMICA CO.
inch is recommended.
vary from 3/8" to 5/8"
to be cut.
LLING.
WORK
Fig. 2
accurately located under drill to pre-
ing bushing and becoming dull.
WORK
2 OR 3 TIMES PITCH
Fig. 3
-tting glass-base material use Morse quick-twist
olized drill. For tapping procedure has been
ardized for all types of materials. A ground high-
d steel Morse electrolized tap is recommended.

Why FORMICA says:

Reg. U. S. Pat. Off.

"Use MORSE Electrolized Tools!"

Top performance on the job, hole after hole after hole . . . that's why the instruction manual of the Formica Corporation specifies:

"*For Drilling Glass-Base Material:*
MORSE Quick-Twist *Electrolized* Drill . . .

"*For Drilling Paper and Fabric-Base Materials:*
MORSE Slow-Spiral *Electrolized* Bakelite Drill . . .

"*For Tapping:*
Procedure has been standardized for all types of materials.
A ground High-Speed Steel MORSE *Electrolized* Tap is recommended."

Formica, like every other concern that has tested it, finds that the exclusive MORSE process of *Electrolizing* gives up to 30% longer tool life on the toughest jobs. And the only source for *Electrolized* cutting tools is the Morse-Franchised Distributor.

MORSE TWIST DRILL & MACHINE COMPANY • NEW BEDFORD, MASS.
Subsidiary of VAN NORMAN INDUSTRIES, INC.
Warehouses in New York, Chicago, Detroit, Dallas, San Francisco

MORSE means "THE MOST" in Cutting Tools

Q: If you're BROACHING intricate forms on ... can you do one in ...

A: Actual floor-to-floor time, including 12 minutes to load and unload is only 30 minutes on this LAPOINTE -

That's pretty fast, for 38 slots . . . and every slot broached perfectly to close tolerances, around the periphery of a stainless steel turbine wheel having 1½-inch rim thickness. Fully automatic operation — no downtime, no rejects, *no problems!*

This Lapointe Electro-Mechanical Broach, built with 30 hp motor and 100-inch stroke, is generally acknowledged as the *right* machine for broaching small turbine wheels ranging in size from 10-inch to 12½-inch diameter. The number of slots can be changed, and the machine will also accommodate other wheels of the same design by changing the adapter.

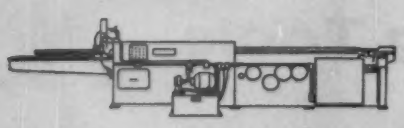
Whether you're broaching turbine wheels or performing some other equally difficult repetitive metal cutting operation, it will pay you to look in at Lapointe — where you can place the responsibility for your entire broaching program: we design and build the broaching machines, design and build the broaching fixtures, design and make the broaches.

THE LAPOINTE MACHINE TOOL COMPANY

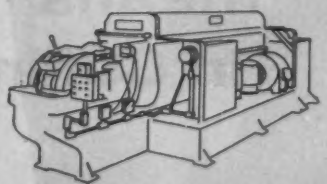
HUDSON, MASSACHUSETTS • U.S.A. *In England: Watford, Hertfordshire*

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

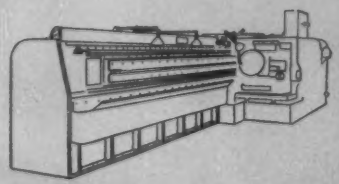
Here's a line of ELECTRO-MOTIVE DRIVE BROACHING MACHINES . . . . . available only at LAPOINTE



60" STROKE HORIZONTAL, ELECTRIC



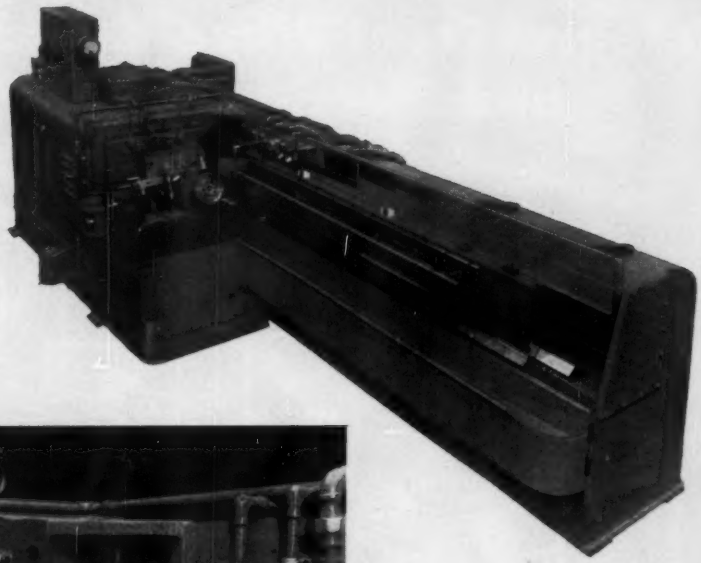
CH CONTINUOUS BROACHING, ELECTRIC

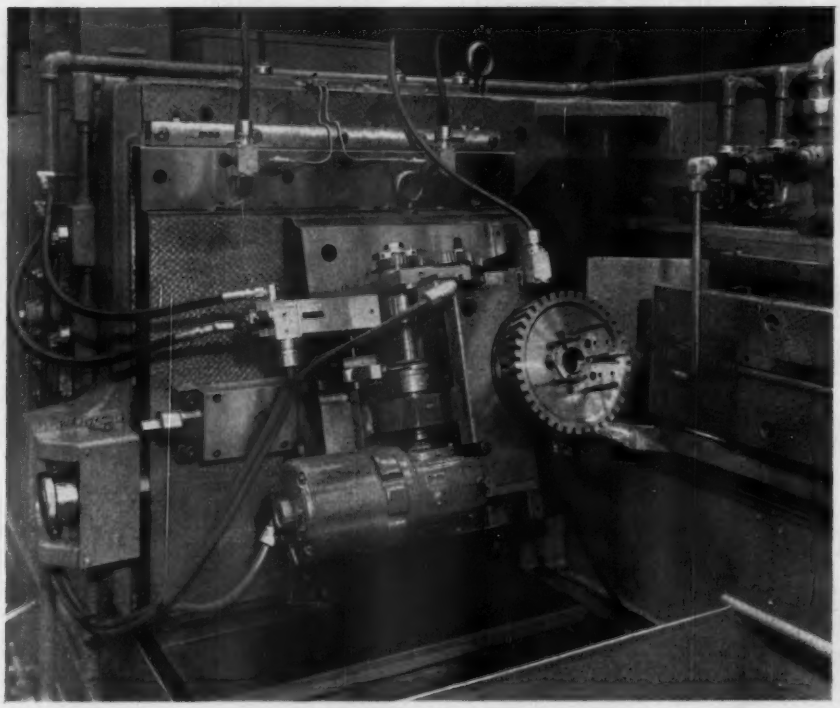


SRHE SINGLE RAM HORIZONTAL, ELECTRIC

SMALL TURBINE WHEELS 30 MINUTES?

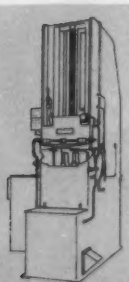
ELECTRO-MECHANICAL® BROACH



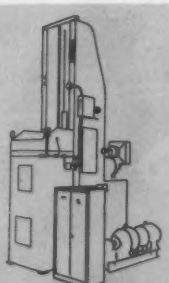


Versatile, flexible, *smooth*, this Lapointe 30/100 SRHE Electro-Mechanical Broach has variable speeds . . . up to 300 feet-per-minute and more. Available in two slide widths, 16" and 27", and in strokes up to 240-inch.

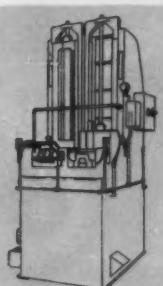
The Lapointe-designed broach adapter shown at the left is built with full back-up support. Fixture has a fixed angle, but the machine can be supplied with universal cradle type fixture.



VUE-7 VERTICAL PULL-UP ELECTRIC



SRVE SINGLE RAM VERTICAL, ELECTRIC



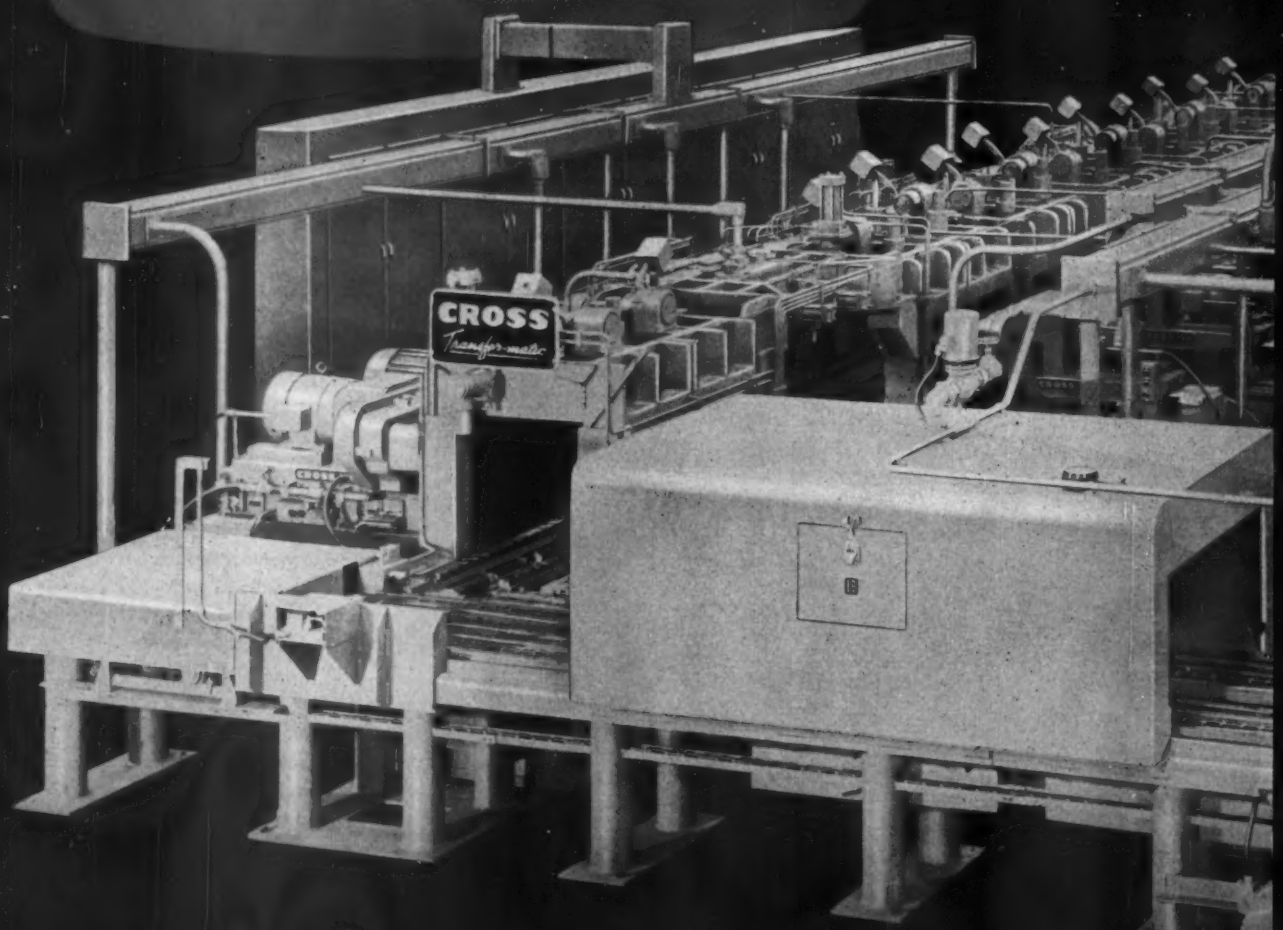
DRVE DOUBLE RAM VERTICAL, ELECTRIC

LAPOINTE

known to be the best in

BROACHING

Mills, Drills, Reams, Threads Integral Front Wheel Spindle and Steering Arm



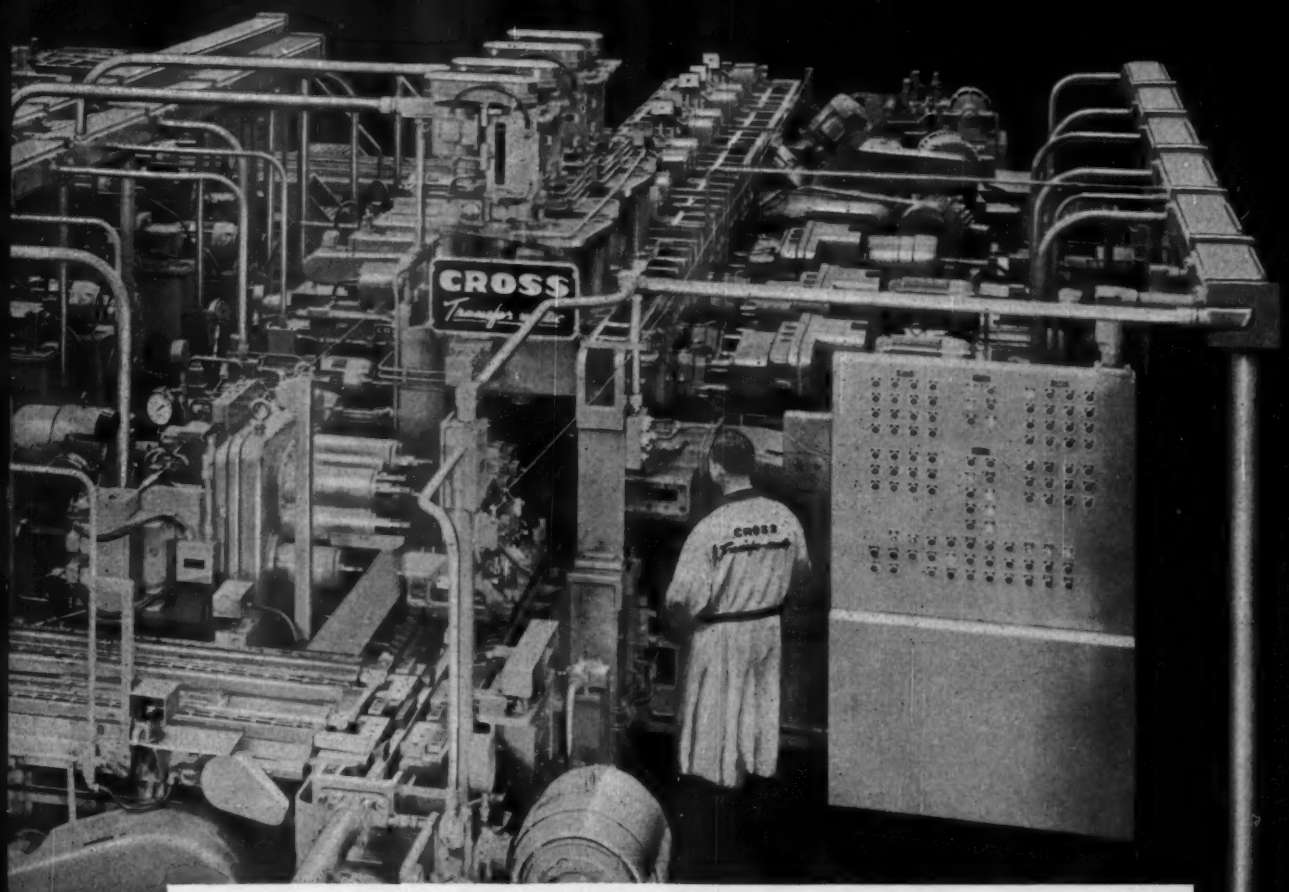
Established 1898

THE CROSS CO.

First in Automation

PARK GROVE STATION • DETROIT 5, MICHIGAN

Another Transfer-matic by Cross



★ Straddle mills upper and lower support arm bosses; straddle mills steering arm boss; mills steering arm stop pad; mills spindle keyway; drills and taper reams upper and lower support arm holes and steering arm hole; drills, reams, chamfers and spotfaces two brake mounting plate holes; drills, counterbores, spotfaces, chamfers and reams brake anchor hole; drills spindle cotter pin hole; and threads wheel spindle.

★ 144 right and 144 left hand parts per hour at 100% efficiency.

★ Pallet type work holding fixtures locate parts from spindle bearing diameters.

★ Power wrench clamps work holding fixtures automatically.

★ Gravity operated cam clamps for the work holding fixtures.

★ Automatic transfer mechanism indexes right and left hand parts through all 17 stations in pairs.

★ Automatic indexing units turn fixtures 82° at Stations 11 and 17.

★ Cross modular unit construction provides flexibility for design changes.

★ Other features: construction to JIC standards; hardened and ground ways; hydraulic feed and rapid traverse for milling, drilling and reaming; individual lead screw feed for threading; automatic fixture cleaning unit; complete interchangeability of all standard and special parts for easy maintenance.

Let's toss a bouquet to the modern super-market — one of the greatest time and trouble savers in present-day living.

But, have you ever stopped to think that, in the abrasives field, Norton brings you real super-market convenience? Here, in the world's largest line of abrasive products, is everything you need for every grinding job.

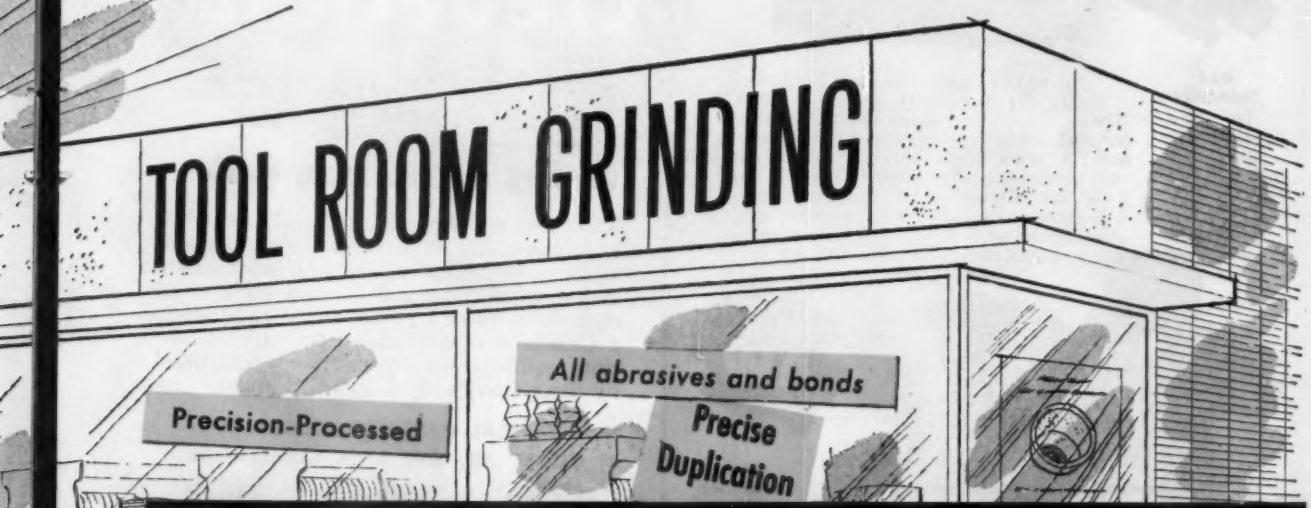
Take tool room grinding wheels. In these, as in all other categories, the Norton line is 100% complete. You don't have to shop around — going to one source for wheels that will sharpen steel tools, to another for diamond wheels, to another for mounted wheels.

You can get them all at Norton. And they're all the best wheels that can possibly be made. The advanced equipment and broad experience you find at Norton you'll find nowhere else in abrasives manufacture.

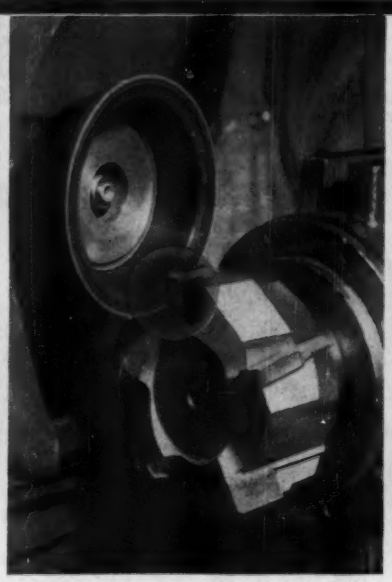
Advantages like these mean leadership. And they result in precision-processed, precision-performing wheels that grind exactly alike — from wheel to wheel and lot to lot.

See Your Norton Distributor for wheels that will bring the value-adding, profit-boosting "Touch of Gold" to all your tool room grinding operations. Ask him for the two helpful booklets — *A Handbook on Tool Room Grinding* and a booklet on *How To Select Wheels For Precision Grinding Tool And Constructional Steels.* Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, yellow pages. Behr-Manning Company, Troy, N. Y., a division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated. **For the booklets or other information write to Norton Company, Worcester 6, Mass.**

TOOL ROOM GRINDING



FOR SHARPENING STEEL TOOLS, as well as for surface, cylindrical and internal grinding on all steels, Norton G Bond and BE Bond Wheels — in 32 ALUNDUM*, 38 ALUNDUM, 19 ALUNDUM or the new non-premium priced 44 ALUNDUM abrasive — add the money-saving, cost-cutting "Touch of Gold." These vitrified bonds are the most efficient ever developed for precision and semi-precision grinding.



FOR CARBIDE GRINDING, Norton diamond wheels are the recognized "Crown Jewels." Made in the regular B resinoid bond for wet grinding and the B6 resinoid bond for dry grinding. For many carbide grinding jobs Norton K Bond CRYSTOLON* wheels are often the best investment.

FOR DIE AND MOLD FINISHING Norton mounted wheels bring you big savings on the widest range of tool room jobs. They're a 100% complete line, for all requirements.

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

NORTON
ABRASIVES

Making better products...
to make your products better

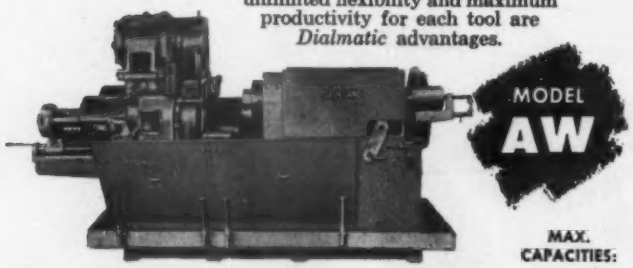
NORTON PRODUCTS: Abrasives • Grinding Wheels
Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening
Stones • Behr-cut Tapes

W-1763

MODEL
AB
DIALMATIC

MAX. CAPACITIES:
1¾" 3"
1⅝" 4¼"
2½" 5¾"

The most modern automatic available today. Equipped with Electronic Feed Drive. Turret tool feeds are infinitely adjustable, set by control panel dials. On 1¾" and 1⅝" sizes, turret feeds *and* spindle speeds are electronically controlled, The 2½" and 3" AB can be quickly converted to a chucker. Ease and rapidity of set-up, unlimited flexibility and maximum productivity for each tool are *Dialmatic* advantages.

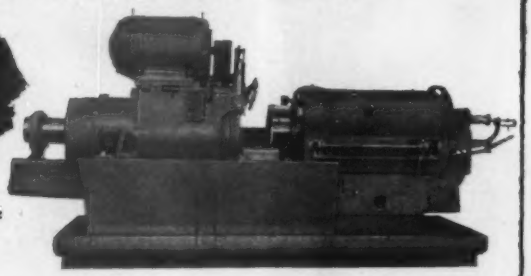


MODEL
AW

MAX. CAPACITIES:
2½"
4¼"
5¾"

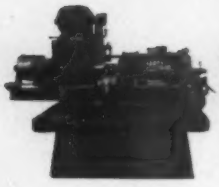
Differs from Model AB design only in that variable turret tool feeds are obtained through an improved mechanical drive. These are high-speed, accurate, rugged machines, quickly set up, easily operated. Their simplified mechanical design assures the user the utmost in freedom from downtime.

MODEL
A



MAX. CAPACITIES:
1⅛"
8"

More than seven hundred in use have proved Clevelands time-tested *universal camming*. No special cams required to perform any work within the capacity of the machine.



MODEL
B

MAX. CAPACITIES:
1⅛"
2½"

MODEL
B-18

MAX. CAPACITIES:
1⅛"
2½"

Model B's do not have tool turrets. Tooling is mounted on a milling slide capable of turning several OD in one operation, plus one end working operation, and on two cross slides where forming and additional turning can be performed. Ideal for work involving multiple diameters, shoulders, chamfers, tapers, etc. Model B-18" handles work up to 18" long. A 24" machine is also available.

there's a
CLEVELAND
Single Spindle Automatic exactly right for your turning and forming work

The Cleveland Automatics briefly described at left combine an extremely wide range of multiple-tooled operations with quick set-up and simplified control. Four models in 16 capacities, make it possible for you to select a Cleveland *exactly suited* to your production requirements. Typical work performed by these Clevelands is shown below.

TYPICAL PARTS PRODUCED BY MODEL AB, AW or A CLEVELANDS

TYPICAL PARTS PRODUCED BY MODEL B CLEVELAND

Whichever Cleveland you select, you'll obtain a modern machine tool that will give you fast, accurate, economical production on long or short runs. You'll also be taking advantage of 65 years of experience in precision engineering, plus Cleveland's matchless reputation for reliability and service.

Investigate the many advantages of Cleveland Automatics for your production. Call in a Cleveland sales engineer or let us submit recommendations with production and cost estimates based on part samples or prints of your work. There is no obligation.

For detailed descriptions of these Cleveland Automatics, write for new General Bulletin.

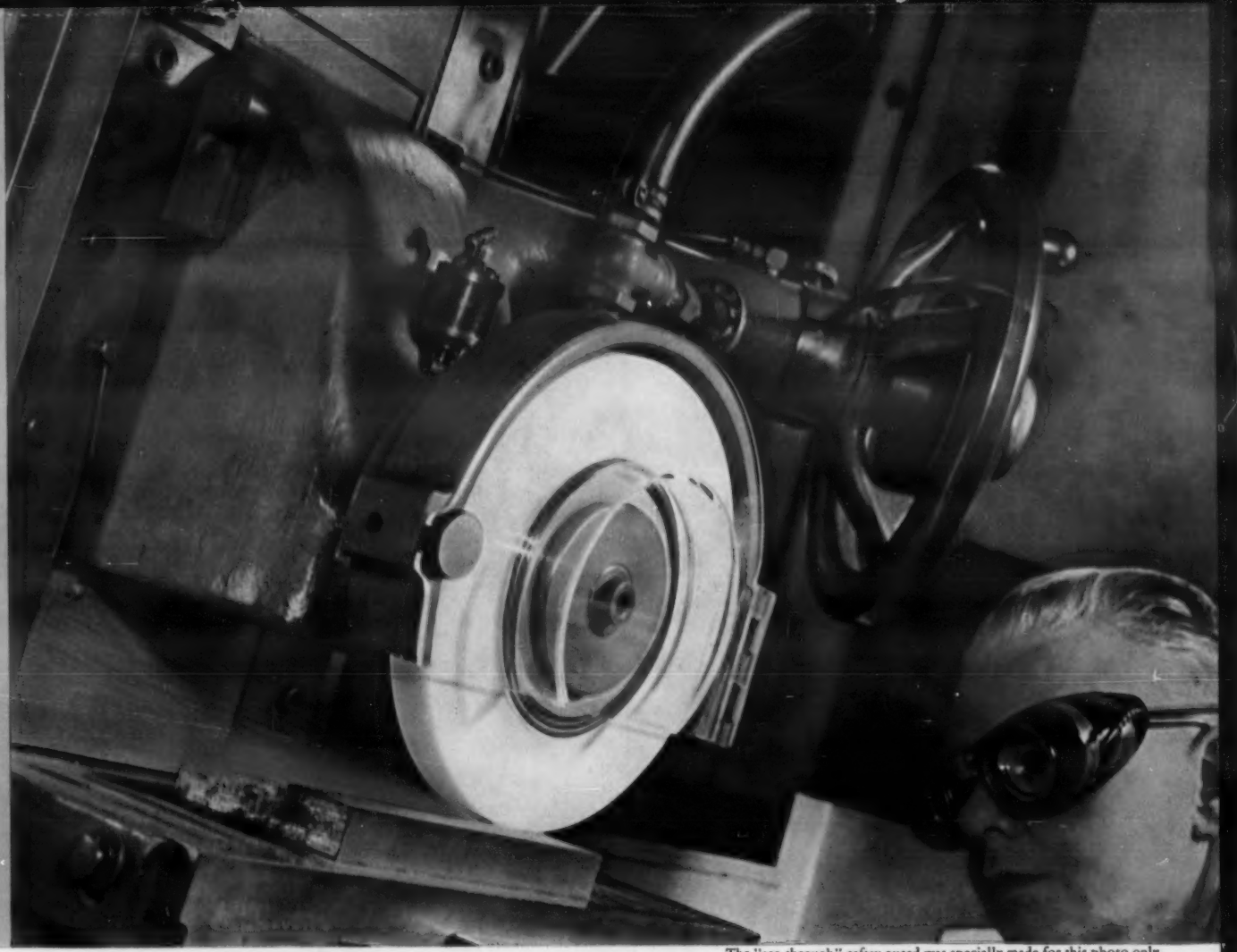
THE CLEVELAND AUTOMATIC MACHINE COMPANY

4928 Beech Street
Cincinnati 12, Ohio
SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • S. ORANGE

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

IMPORTANT: For your convenience this sheet is perforated. Tear it out and "buck-slip" it to the proper man in your plant.

Here's the famous V40 Tool Room Wheel in action! Two years of proven industry-wide supremacy have made these V40 wheels "a must" in tool room operations. Check the case history on the back of this page.



The "see-through" safety guard was specially made for this photo only.

Ask the man from **CARBORUNDUM** REGISTERED TRADE MARK **BONDED ABRASIVES DIVISION**

Also makers of a complete line of Coated Abrasives and Abrasive Grain

ATTENTION TOOL ROOM FOREMAN: Turn the page and see the Product Performance Report written especially for you.

PRINTED IN U.S.A. 781

Product Performance Report

SURFACE GRINDING HIGH CARBON STEEL

Operation

1. Surface grind to size high carbon, high chrome plunger.

Project

2. Grind, from the solid, in one operation a radius and flat slot in the same mold plunger.

Results

Select wheels to grind without burning or checking the plunger that will produce a fine M. I. finish at a fast production rate.

1. AA46-H8-V40 surfaced the plunger to a total indicated flatness and parallelism of .0002″ maximum, generated a finish of 10 M. I. and produced a uniformly appearing surface that was entirely free from burn and check. The grinding done at these speeds and feeds—

INFEED	CROSSFEED	TABLE SPEED
.003″ per pass	1/32″	50 F. P. M.

2. AA46-H8-V40 on a wet operation ground the complex radius and flat slot from the solid and removed a depth of .376″ in 16 minutes. The form was free from burn and check and measured a maximum of 10 M. I. in roughness.

Note

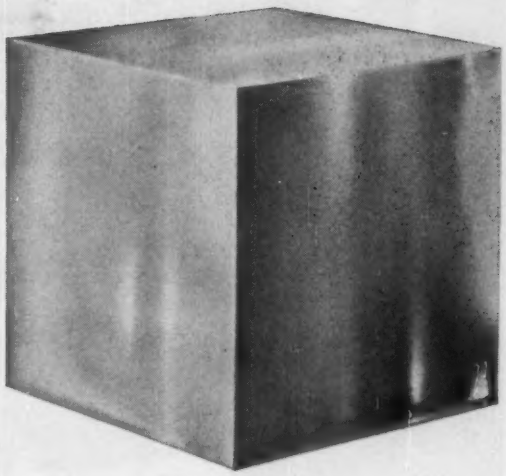
Carborundum, leader in abrasive techniques, backs up its products with trained sales representatives, a staff of competent field engineers and an abrasive engineering laboratory ... all available to you to put more sense in your abrasive dollar.

Here is another in the series of Product Performance Reports being released by the Bonded Abrasives Division of The Carborundum Company. A color photograph of this actual operation is shown on the back of this page.

• *Ask your local distributor... or the man from*

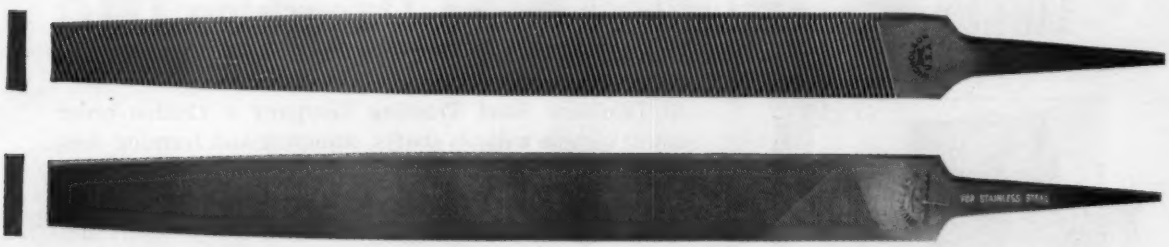
CARBORUNDUM
REGISTERED TRADE MARK

701 PRINTED IN U.S.A.



For soft lead...or durable stainless steel...

Nicholson makes a file for every purpose



Whether you work with soft lead or babbitt . . . or whether you have to file rugged stainless steel . . . there's a Nicholson-made file that's been designed specifically for the job at hand.

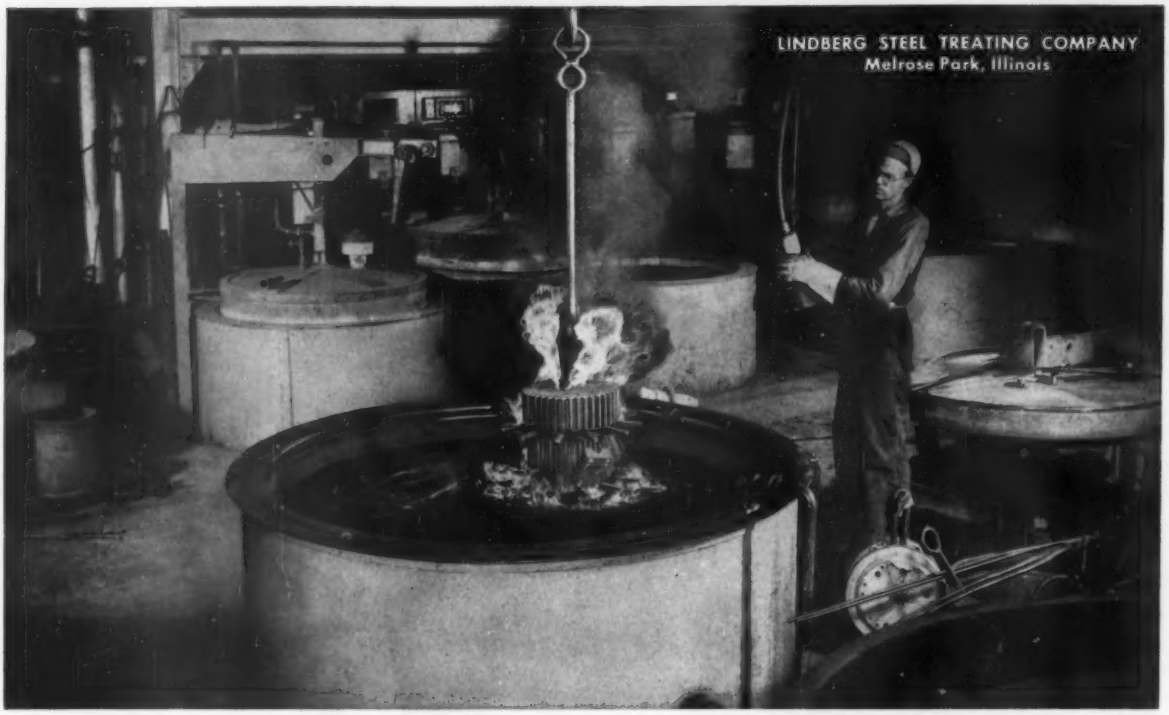
Not only do we make the world's finest files, but we make them to meet every industrial need—for the softest metals and the hardest . . . for the most delicate instruments and for those big jobs that require rapid but efficient metal removal.

You can select Machinist's files . . . Regular Purpose files and rasps . . . Special Purpose files for aluminum or plastics . . . X.F. (*EX*tra *F*ine) Swiss Pattern files in hundreds of shapes and sizes . . . over *6000* high-quality varieties.

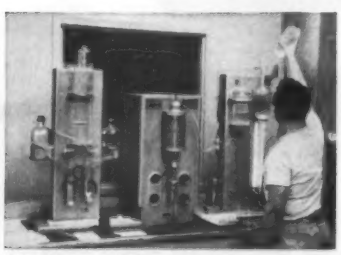
If you work with metal, you can use Nicholson or Black Diamond files

NICHOLSON FILE COMPANY, PROVIDENCE, RHODE ISLAND
(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

NICHOLSON FILES *A FILE FOR EVERY PURPOSE*



For machine shop tolerances— Lindberg uses Cities Service Quenching Oil



Lindberg's Lab stringently tests treated metals. Dimension changes from poor quenching oil would quickly show up here. But Cities Service Quenching Oil cools metal with no significant dimensional change.

Some of Lindberg's Furnaces. Here, they heat-treat all kinds of steel products . . . bolts, washers, gear blanks, saw blade segments, etc. Steel for bars of Illinois State Penitentiary was one of their first jobs.

At Lindberg Steel Treating Company a routine order might include a dozen shafts, stamping and forming dies, jigs and fixtures and even production parts. But though the products might differ, most would carry the same stipulation—heat treat with very low dimensional change.

To some heat treating operations this might present a problem, but not to Lindberg. By the use of Cities Service Quenching Oil, they're able to cool their steel with no significant changes in dimension.

"In addition," say Lindberg metallurgists, "we like Cities Service Quenching Oil because it has high flash point, consistent viscosity, excellent oxidation resistance, and a stable cooling rate."

Anyone looking for a better quenching oil would do well to try this superior Cities Service oil. For further information, talk with your local Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

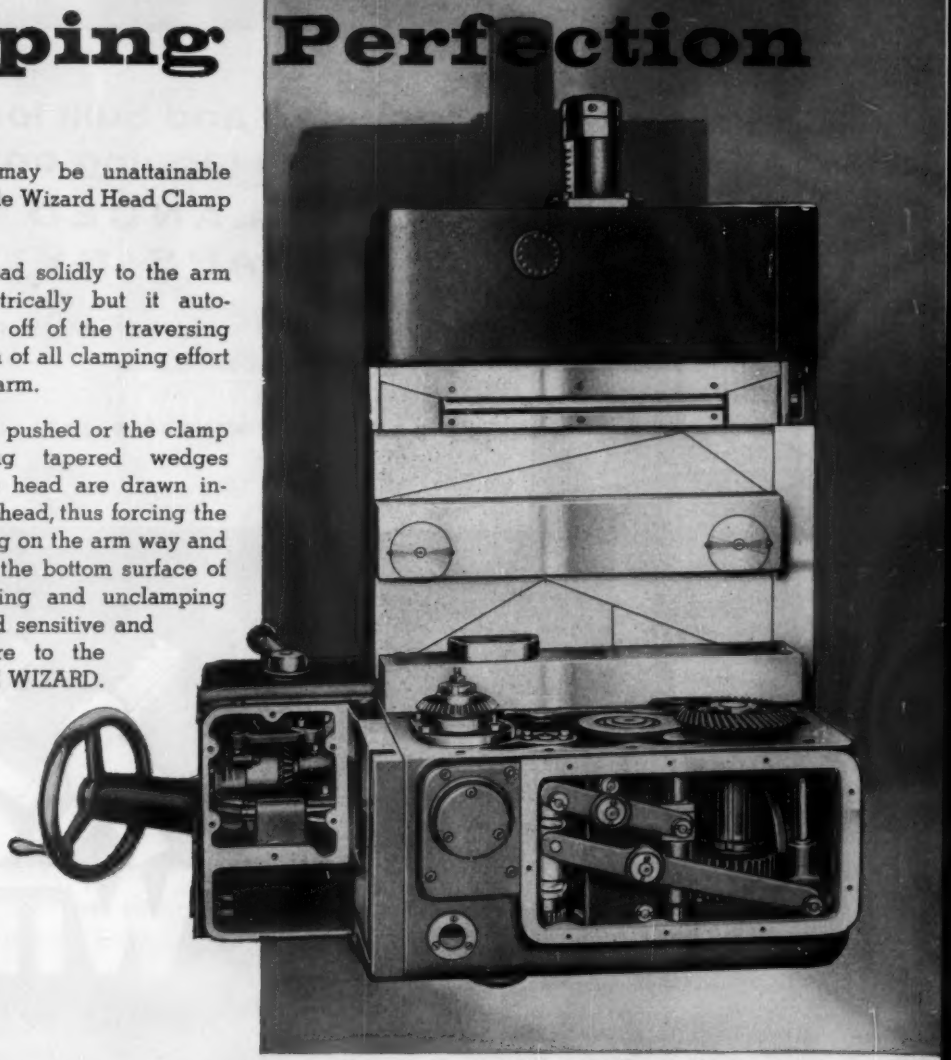
QUALITY PETROLEUM PRODUCTS

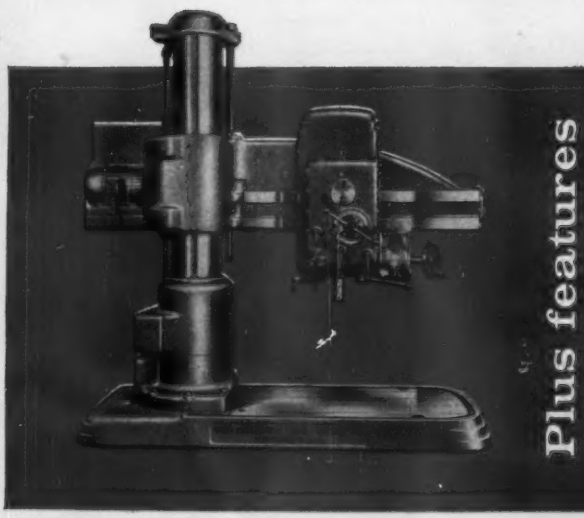
Clamping Perfection

Theoretically perfection may be unattainable but practically the new Hole Wizard Head Clamp is perfect.

It not only clamps the head solidly to the arm either manually or electrically but it automatically raises the head off of the traversing rollers, thus relieving them of all clamping effort and binds it solidly to the arm.

When the clamp button is pushed or the clamp lever actuated, opposing tapered wedges between the arm and the head are drawn inwardly at each side of the head, thus forcing the head off of its roller bearing on the arm way and wedging it solidly against the bottom surface of of the arm. This clamping and unclamping action is instantaneous and sensitive and adds another plus feature to the "AMERICAN" NEW HOLE WIZARD.





Plus features

Speaking of Plus Features here are a few you will want in your next radial.

- Centralized Control.
- Lightning-fast Direct Reading Speed Change.
- Nitrided Spindle and Sleeve—practically wear proof.
- Timken mounted column unit defies deflection.
- Raybestos covered, spring steel tapping attachment friction bands, quick acting, wear proof, permitting 40% speed-up for spindle reverse.

These are just a few . . .
learn the others from bulletin No. 328

THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

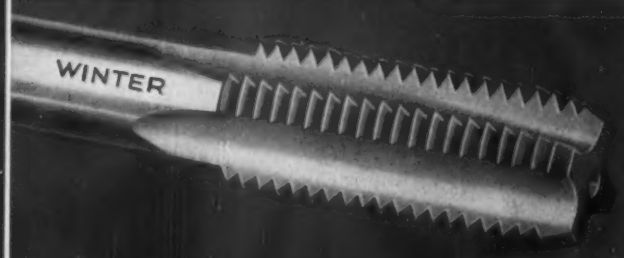
UNIFORMITY OF FLUTE CONTOURS is one of the four essentials in Balanced Action performance—exclusive with Winter Taps.

Designed and built for men who know tapping costs:

BALANCED ACTION TAPS BY WINTER

The Winter Tap user has learned to consider only one cost: the *cost-per-hole*, shown by his records of accurate holes and long life.

CALL YOUR WINTER DISTRIBUTOR



EXACT FLUTE SPACING

WINTER

WINTER BROTHERS COMPANY

Rochester, Michigan, U.S.A.

Distributors in principal cities. Branches in New York • Detroit • Cleveland • Chicago • Dallas • San Francisco • Los Angeles • Division of National Twist Drill & Tool Co.

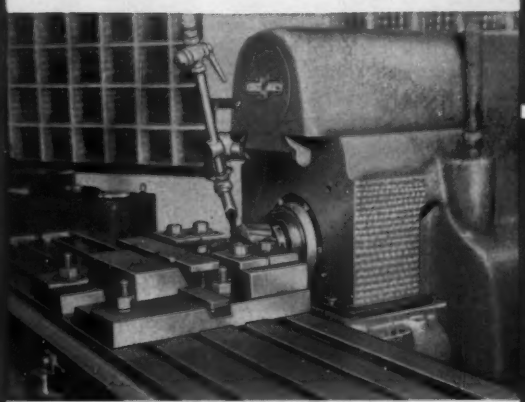
PRECISION CHIP DRIVE CONTOURS

ACCURATE AND CONCENTRIC CHAMFERS

Lowering the cost of metal cutting through laboratory research...

is a continuing process at National's Rochester plant. Many of the findings are already evident in the improved National tools of today; more can be expected in National's tools of tomorrow.

CALL YOUR NATIONAL DISTRIBUTOR



The search that never ends for better cutting methods... test milling of high tensile strength steel.

National

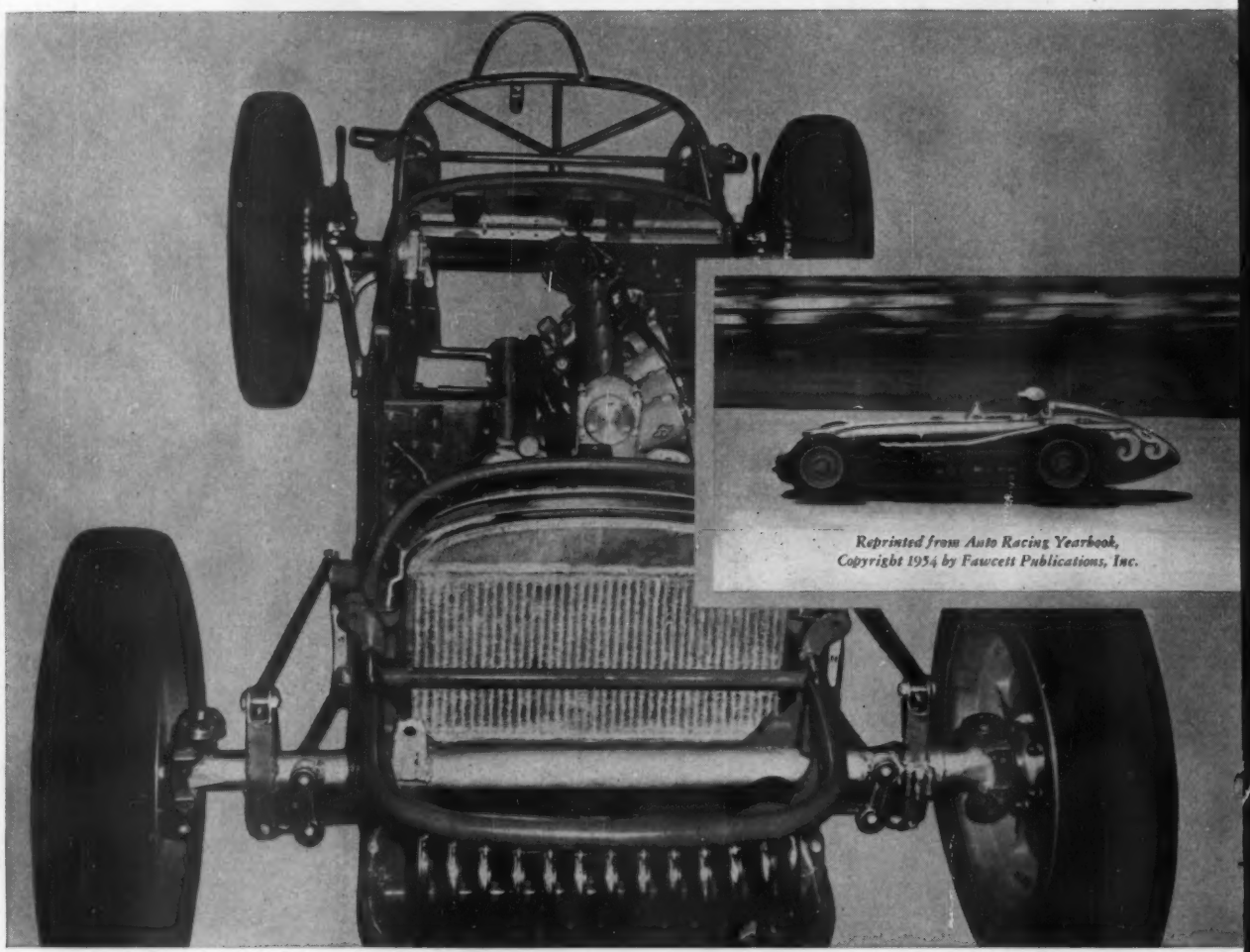
NATIONAL TWIST DRILL AND TOOL COMPANY

Rochester, Michigan, U.S.A. Distributors in principal cities. Branches in New York • Detroit • Cleveland • Chicago • Dallas • San Francisco • Los Angeles

TWIST DRILLS • REAMERS • COUNTERBORES • MILLING CUTTERS • END MILLS • HOBS • CARBIDE AND SPECIAL TOOLS

WHEN IT'S *MOVING*...MAKE IT *TUBING*

Pound for Pound, Tubular



The body frame of this high-performance racing car is fabricated from steel tubing to obtain maximum strength at reduced weight.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

Construction is STRONGEST!

That's why racing-car designers and builders fabricate body frames from steel tubing. A combination of high speed and rugged endurance demands a framework that is both lightweight and strong.

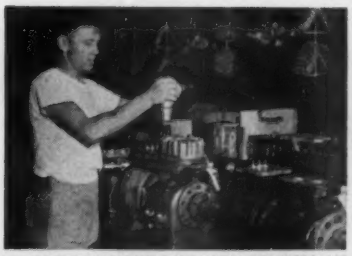
They know that at any given weight, tubing is the strongest of all mechanical shapes—stronger in torsion, stronger as a beam, stronger under compressive loads.

When it comes to a choice, remember: The most economical steel mechanical tubing, dollar for dollar, is Republic ELECTRUNITE®, the *original* electric resistance welded tube. Recognized throughout industry for its exceptional quality, Republic ELECTRUNITE is available in a wide variety of forms, sizes and gages—in both carbon and stainless steels.

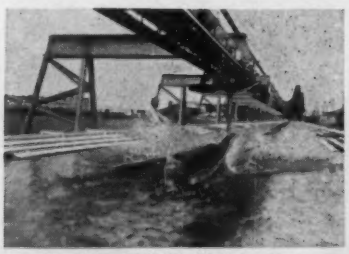
Though produced in great volume, every foot in every shipment of ELECTRUNITE tubing is *consistently uniform,* including wall thickness, ductility and concentricity. Surfaces are free from scratches and pit marks. Response to heat treatment is uniform. And it is easy to bend, work with . . . often eliminates costly fabricating or machining operations.

If strength, lightness, safety are requirements in your product, investigate Republic ELECTRUNITE Steel Tubing. Our engineers will help you with design problems, show you the way to greater economies and profits. Send coupon for facts.

MORE REPUBLIC PRODUCTS MADE FOR MOVEMENT:



CYCLIC COMPRESSOR OPERATION REQUIRES AN ABSOLUTE SEAL at the joint between compressor cylinder and head. Republic Alloy Steel Hex Head Cap Screws are made to order for this application because they neither stretch nor lose their grip under the heating and cooling cycle of on-off operation. In fact, they more than meet tensile strength, yield point, hardness and ductility requirements. Republic makes 20,000 standard and 8,000 special types of headed and threaded products for every application. Send coupon for full information.



STRONG RESISTANCE TO CORROSION, WEAR AND ABRASION make Republic Cold Finished Stainless Steel Bars ideal for this unique application. It's a testing tank for advance-type seaplane hulls. Testing is conducted by suspending hull model from carriage which rolls on Republic Stainless Steel Bars. Besides ease of maintenance, these bars provide higher tensile and yield strength, close tolerance, and a fine surface finish, permitting smooth, accurate operation of testing device. Republic metallurgists and engineers will help you apply stainless steel to your present and future work.

TITANIUM PROVIDES STRENGTH AND WEIGHT-SAVINGS in aircraft such as the DC-7. Republic is an old hand at this high strength-to-weight business. We pioneered the use of alloy steels, then stainless steels—followed by high strength steels. Now come Republic Titanium and Titanium Alloys. Years of experience gained in helping hundreds of manufacturers design and re-design their products to get more strength with less weight are available to you. To get more information on how corrosion-resistant titanium can solve many problems, send coupon.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
Dept. C-2438
3102 East 45th Street
Cleveland 27, Ohio

Please send more information on:

☐ Mechanical Steel Tubing ☐ Stainless Steel
☐ Fasteners ☐ Titanium

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

2 COST-CUTTING WAYS to

B&S No. 10N
with Plain or Universal Equipment

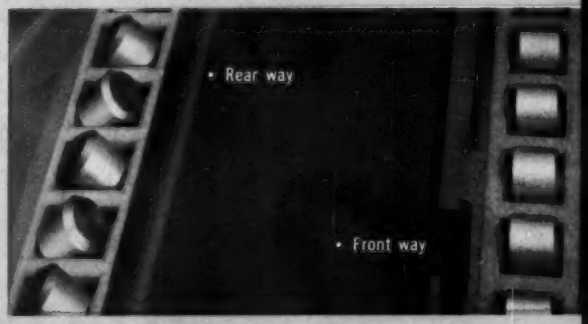
- For top efficiency on routine sharpening, light external and internal cylindrical grinding, and surface grinding. Capacity _____ 10" x 20"
- Super-smooth transverse movement on unique roller bearing carriage.
- Permanently-mounted internal grinding attachment swings into work position!

Better Cutter and Tool Sharpening

- For easier sharpening of cutters, tools, and end-mills
- Capacity .....6⅜" x 17½"
- Takes less than 8 sq. ft. floor space!

Faster to set up, easier to handle, smoother in every detail of operation, these two Brown & Sharpe Cutter and Tool Sharpening Machines really save time! Both give you the same basic convenience-design that permits greater operating speed—consistent high precision on every job. For example: Wheel-mounting at both ends of the spindle for easy 360° maneuverability; eye-level elevating handwheel with wide-spaced graduations and adjustable zero; operating controls at both front and rear; super-precision spindle that greatly reduces wheel-truing time; unique roller bearing Precision Glide table-mounting for extra-easy movement; table dog design that makes reversal practically effortless. And a cutter bar attachment that *eliminates* critical table setting on peripheral sharpening of most arbor-type cutters!

What's more, many design features such as the roller bearing table and permanently-sealed, anti-friction wheel spindle assure you *lasting* troublefree performance. Write for complete specifications on these fast, economical sharpening machines. Brown & Sharpe Mfg. Co., Providence, R.I.



Both machines feature PRECISION-GLIDE roller bearing table movement for smoother operation, minimum wear, accurate alignment

Brown & Sharpe B·S

MILLING, GRINDING, AND SCREW MACHINES • CUTTERS • MACHINE TOOL ACCESSORIES
PRECISION TOOLS • PUMPS

what's the DIFFERENCE . . .

the DIFFERENCE is . . .

To you, the user or buyer, the most important difference between MARVEL High-Speed-Edge Hack Saw Blades and ordinary blades is the *unequalled* performance you get from MARVEL Blades.

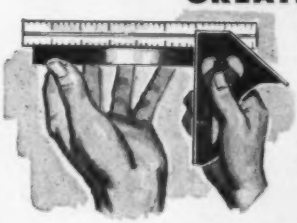
Performance reflected in higher production (faster cutting-off), greater accuracy of cut-off blanks, and longer blade life has made MARVEL the preferred blade in every kind of metal sawing operation.

To get the *difference* in performance, always insist on MARVEL High-Speed-Edge Hack Saw Blades. Leading Industrial Distributors have them in stock.

Write for "The MARVEL Story." It has complete details on MARVEL High-Speed-Edge Hack Saw Blades and Hole Saws.

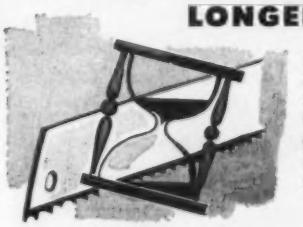
HIGHER PRODUCTION

Unbreakable MARVEL High-Speed-Edge Blades can be worked faster and harder than any other blade with complete safety. They will withstand the highest speeds and heaviest feeds attainable on any make hack sawing machine. MARVEL Blades will cut any machineable metal. No wasted time changing blades for different materials.



GREATER ACCURACY

Composite construction permits MARVEL Blades to be tensioned from 200% to 300% more taut than ordinary blades. This produces greater rigidity of the high-speed-steel cutting edge, resulting in maximum obtainable accuracy of cut-off blanks.



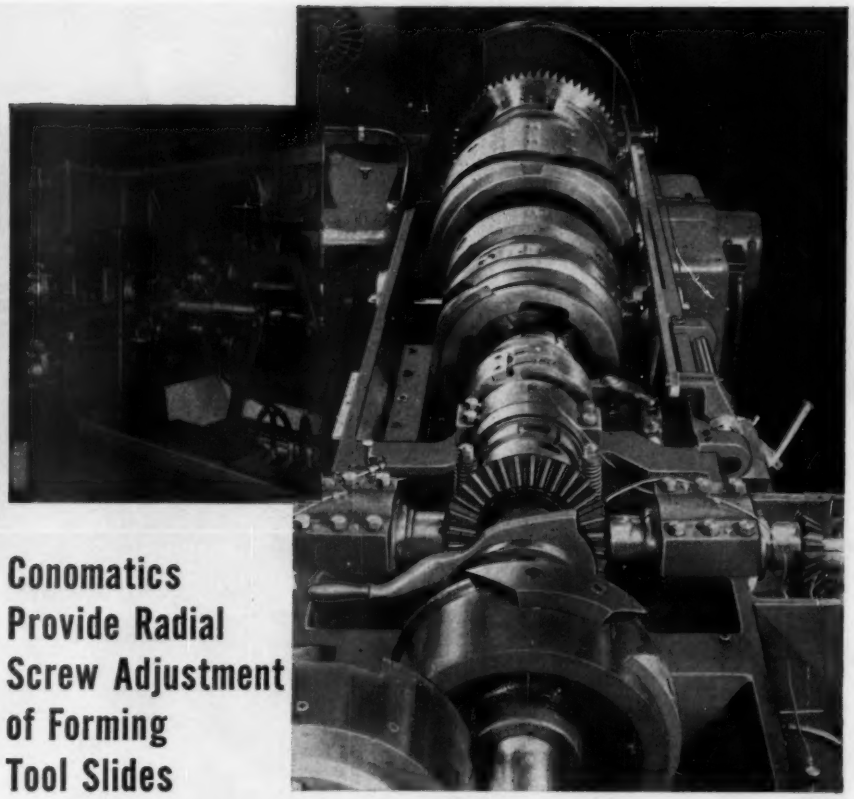
LONGER BLADE LIFE

Each MARVEL High-Speed-Edge Hack Saw Blade is triple tempered to assure maximum toughness of the cutting edge. MARVEL Blades not only give you longer life, they assure a *more efficient* cutting life, with resulting lower blade costs.

B-1121

ARMSTRONG-BLUM
MFG. CO.
5700 WEST BLOOMINGDALE AVE. • CHICAGO 39, ILL.

MARVEL *Metal Cutting* SAWS
Better Machines–Better Blades

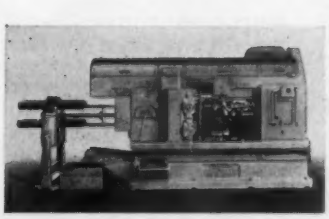


Conomatics Provide Radial Screw Adjustment of Forming Tool Slides

- Models 2⅝" LA, 3½" AD, 5" KL, and 5¼" KR Conomatic Four Spindle Bar Machines are equipped with a number of quick job-change features. One of these is the all-position end attachment drive for the mounting of endworking opposed spindles in all positions, with independent feed to as many as three opposed spindles on a single setup.

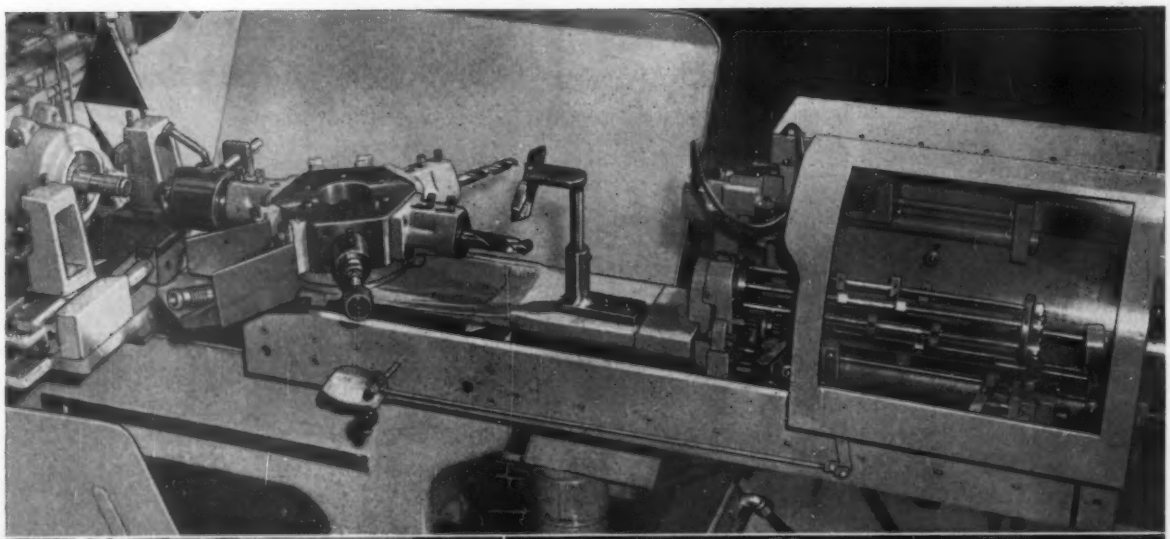
  Another feature that is of considerable importance in tooling up is the radial screw adjustment of all sideworking slides. Trial cuts may be taken to correct diameters with form tools without changing the clamped positions of the form tool holders.

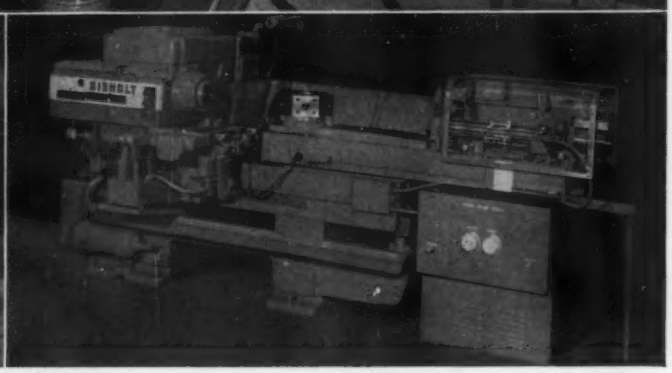
  All Conomatic quick changeover models are equipped with dial adjustment of the working stroke of all tool carrying slides. Besides the Four Spindle machines there are three quick change Six Spindle models in 9/16", 1" and 1⅝" sizes. Write, wire, or phone for literature.



Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U.S.A.





250% Production Increase with this setup

Gets full automation on small job-lot production runs using hydraulic drive on Gisholt Ram Type Turret Lathe

Floor-to-floor time on the job shown here—a threaded collar $3\frac{1}{8}$" long with $1\frac{11}{16}$" diam.—was cut from 8.1 minutes (with hand operation) to just 3.25 minutes. All operations and machine functions are automatically controlled with the Lynn Hydraulic Drive Unit on a Gisholt Ram Type Turret Lathe.

Here's how the finished workpiece is completely machined from bar stock in one fast, automatic operation: The stock is fed pneumatically against a turret stop, chucked, start-drilled, then finish-bored with a large drill. The hydraulic drive backs the drill out automatically to clear the chips, then rapid traverses back to where it left off before dropping into feed to resume drilling. Spindle speed automatically decreases as tools on the front cross slide form the O.D., drops into lower speed as O.D. is threaded, and into another low speed as radii are formed on the finished part and on the end of the bar stock. A tool on the rear cross slide cuts off the finished part and the job is done in record time.

With its massive design, reserve power and extra spindle speeds, the new Gisholt MASTERLINE Ram Type Turret Lathe is particularly adaptable to complete automatic operation with Lynn Hydraulic Drive. Contact your Gisholt Representative. He has the complete facts—and his wide experience may point the way to more profitable operation for you.

MASTERLINE GISHOLT SINCE 1887 GISHOLT

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

WRITE GISHOLT TODAY for all-new, 18-page illustrated Bulletin 1174-B covering features, accessories, tools and floor plans on new Gisholt MASTERLINE Ram Type Turret Lathes.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • PACKAGING MACHINES • MOLDED FIBERGLAS PLASTICS

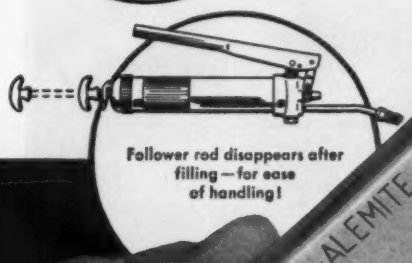
10,000 LBS. OF POWER

for even ordinary lubrication jobs!

FAST, EFFICIENT HEAVY-DUTY ALEMITE HAND GUNS

This rugged Alemite lever-type gun is packed with power and superior features for super performance in industrial lubrication! Develops 10,000 lbs. pressure . . . more than enough for ordinary lubrication jobs—with plenty of reserve power for "tight" bearings! Handles all regular pressure gun greases. Long-operating handle for maximum leverage. Loader fitting permits fast, clean filling (or gun may be filled by suction). Capacity, 1 lb., outlet, ⅛" p.t.

Linkage is heavy steel for true piston alignment!



Follower rod disappears after filling—for ease of handling!

Heavy-duty Lever Gun Model 1056-SE

Loader fitting for fast clean filling with loader pump. No mess—no waste—no air pockets!

Complete line of adapters and hose for all types of fittings!

STEWART SW WARNER

ALEMITE

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Division of STEWART-WARNER CORPORATION

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Please send me your complete catalog on Alemite lubrication equipment for industry.

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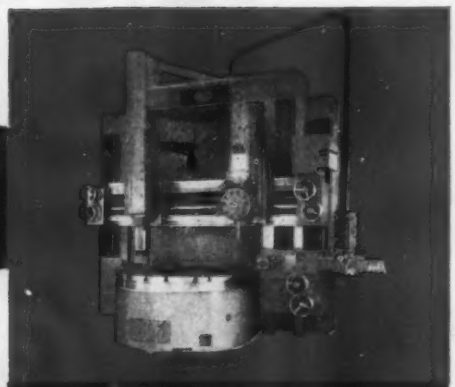
Address_____

City_____ Zone____ State_____

For today's advanced

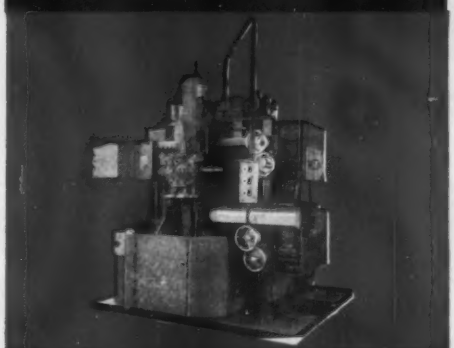
machine tools

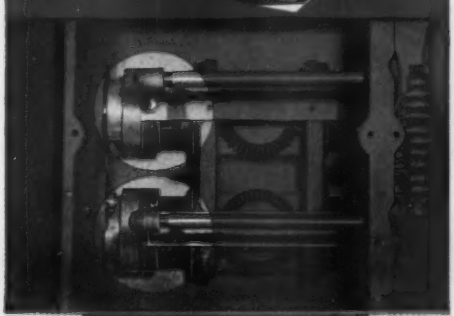
Such as BULLARD MAN-AU-TROL
and CUT-MASTER VERTICAL TURRET LATHES



Above: Maxitorq Single and Double Electric Clutches on Bullard Cut-Master Model 75 Machines with single angular turning attachment.

Below: 4 Maxitorq Single Electric Clutches on Bullard Man-Au-Trol Model 75 Machines with double angular turning attachment.





New **MAXITORQ** ELECTRIC CLUTCHES

Compact, simple in design and construction, fully service-tested, this entirely new clutch design is ideally suited . . . as these Bullard applications show . . . to the new requirements of machine control. Here are the LONG-PROVED advantages of the famous Maxitorq Floating Disc Clutch, now electrically operated, and with these outstanding features . . .

- **Either WET or DRY operation**
- **STATIONARY coil . . . no brushes**
- **NO ADJUSTMENT . . . POSITIVE ENGAGEMENT**
- **STANDARD MAXITORQ DISC PAC**
- **FLOATING NEUTRAL . . . NO DRAG**
- **FULL POWER TRANSMISSION**
- **USED AS CLUTCH OR BRAKE**
- **FULL RANGE SINGLE, DOUBLE TYPES**
- **UP TO 788 LB. FT. OF TORQUE**
- **Operates on 110 V.AC rectified to 90 V.DC . . . other voltages on special order**

Write Dept. AM-3 for full information.

THE CARLYLE JOHNSON MACHINE COMPANY

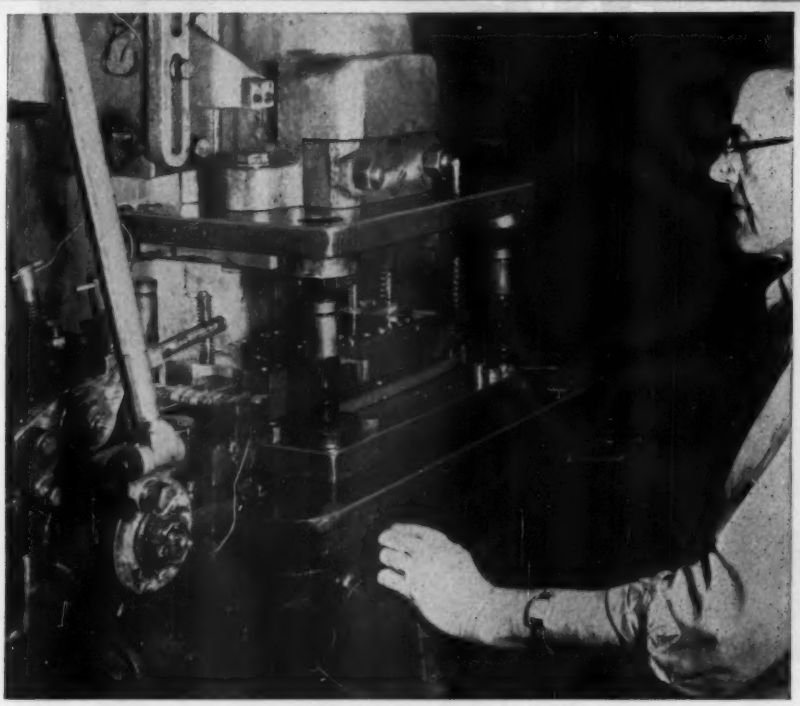
MANCHESTER, CONNECTICUT

Tool Steel Topics

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation



Lehigh H does good job in blanking-and-forming die

Wear-resistance, low distortion, and high compressive strength were the tool-steel requirements needed for a blanking and forming operation at Hickory Springs Manufacturing Co., Hickory, N. C., makers of bed rails and platform rocker hinges. Their choice, and it was a good one, too, was Bethlehem Lehigh H.

The jobs involved blanking and forming cold-rolled strip in thicknesses from 0.060 in. to 0.078 in., in presses of up to 80 tons capacity. The Lehigh H dies, hardened to Rockwell C 58-61, performed satisfactorily, producing about 100,000 pieces between grinds. Only 0.015 in. was removed in redressing.

Bethlehem Lehigh H is an outstanding high-carbon, high-chromium grade of air-hardening tool steel, with the characteristics to take the tough jobs in stride.

TYPICAL ANALYSIS

Carbon 1.55	Molybdenum 0.80
Chromium 11.50	Vanadium 0.40

You'll like Lehigh H the very first day you put it to work. But don't baby it! Give it a real test, one that requires a combination of wear-resistance, shock-resistance, and compressive strength. Your Bethlehem tool-steel distributor has Lehigh H tool steel in stock. Why not call him right now, while you have it in mind.

You Save Time with Hollow-Bar →

If you work with hardened bushings, ring dies or draw rings—in fact, any part requiring a center hole in the steel—you'll save time by using Bethlehem Hollow-Bar Tool Steel. Bethlehem Hollow-Bar is made by a high-speed trepanning process, by which hammer-forged or hot-rolled bars are cored out, then rough-turned on the outside. Hollow-Bar arrives ready to go to work. There's no time lost, no waiting for forged rings or discs. Hollow-Bar is furnished in BTR (Bethlehem Tool Room, oil-hardening), and Lehigh H (high-carbon, high-chrome).

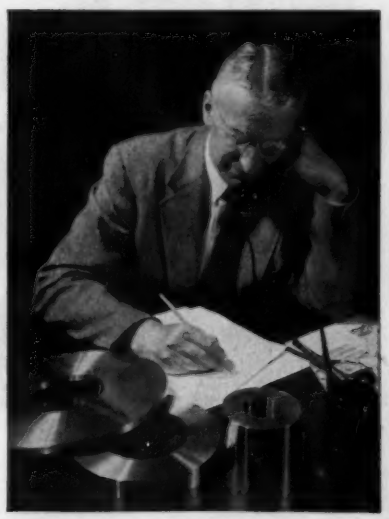
BETHLEHEM TOOL STEEL ENGINEER SAYS:

You Can Salvage Tools Which Have Grinding Cracks

When produced, grinding cracks are usually shallow (0.002 in. to 0.004 in.). If their presence is detected early, it is often possible to salvage the tool, assuming that metal-removal will not render the tool unusable. This can be done by cautious grinding, which removes but a small amount of metal (0.00025 in. per pass), and does not generate excessive heat. To keep heat at the minimum, use a soft, coarse-grit, 36-grain wheel, plus a liberal amount of liquid coolant.

If a number of light cuts are taken, with intervals between cuts to prevent building up temperature, the grinding cracks can be removed, so long as the tool has been properly heat-treated. But if ordinary grinding technique is used, the cracks will enlarge ahead of the grinding wheel, and ultimately will go all the way through the section.

Magnetic-powder testing is required for examination of the tool during the salvage operation, in order to determine when the cracks have been removed. If grinding cracks are detected before a tool is used (this requires magnetic-powder testing in most instances), salvage is usually successful. But should a tool be put in service with undetected grinding cracks, salvage may be impossible because of growth of the cracks in service.



Use WELDED STEEL for Greater Strength with Less Weight!

The large weldment above is a 40-Ton Blank Holder for a 1000-Ton Press . . . this piece, and those illustrated at the left, are typical of thousands of Steel-Weld Fabricated parts and assemblies produced by Mahon for manufacturers of processing machinery, machine tools, and other types of heavy mechanical equipment. Are you taking full advantage of the possibilities offered by welded steel components in your product? In the design of almost any type of heavy machinery there are parts and sub-assemblies that can be produced more economically and more satisfactorily in welded steel, because, in weldments you get greater strength with less weight, plus the additional advantages of greater rigidity and predictability. If you are considering weldments, you can call on Mahon with complete confidence, because, the Mahon organization is a unique source for welded steel in any form . . . a reliable and responsible source with complete facilities for design engineering, fabricating, machining and assembling . . . a source where design skill is supplemented by craftsmanship which assures you a finer appearing product embodying every advantage of Steel-Weld Fabrication. See Sweet's Product Design File for information, or, better still, have a Mahon sales engineer call at your convenience.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

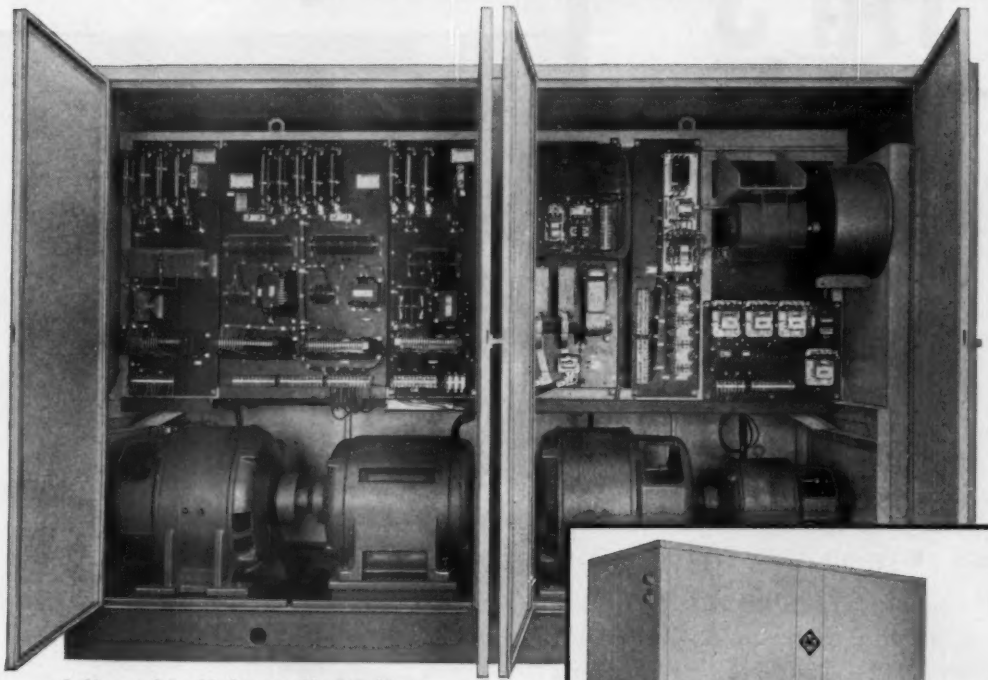
Sales-Engineering Offices in Detroit, New York and Chicago

Engineers and Fabricators of Steel in Any Form for Any Purpose

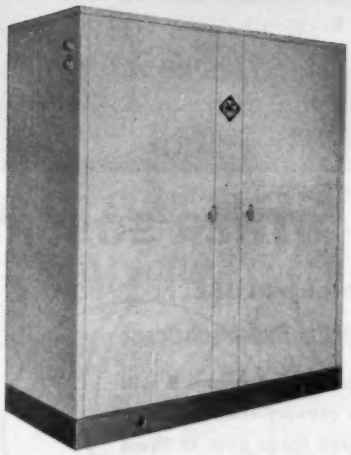
MAHON

There's MORE dependable speed control

- high response
- high shock resistance
- no fragile parts
- no maintenance



Adjustable Voltage Multi-Motor Package Drive is ideal for many industrial applications. Self-ventilation keeps unit clean, minimizes maintenance.



Size 3 Adjustable Voltage Power Unit rated 30 hp, of standard construction. Magnetic amplifier excitation provided.

Every one of the design features of the Allis-Chalmers Adjustable Voltage Package Drive assures you an easy, dependable means of power conversion.

Key to Package Drive dependability is the use of a magnetic amplifier to excite the field of the power unit m-g set. Sturdy and simple, this amplifier has no moving parts to wear out . . . no fragile components to be affected by vibrations. AND — there's no wasteful "warm-up" time needed. At the turn of a dial, you get immediate speed control.

Cost-saving assembly

M-g set and control components are assembled in the power unit enclosure at the factory — saving you installation costs. Enclosures used for 30 through 200-hp units are completely collapsible and may be easily disassembled without loss of rigidity. Larger units have separately driven blowers to provide positive ventilation and pressure even when unit is idle.

Available in units from 5 to 200 hp, the package drive is ideal for any application requiring adjustable speed. Contact your nearby Allis-Chalmers sales office or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5270

SOSSNER TAPS *are triple tempered*

ONE TEMPERING DELIVERS 1/2 A TAP
TWO TEMPERINGS DELIVER 3/4 A TAP
T S T
THREE TEMPERINGS DELIVER A FULL VALUE TAP
The Mark of Triple Tempering

Yes! Sossner taps are tempered, not just once, not just twice, but THREE TIMES. The result . . . a tougher, more reliable, longer lasting tap . . . less chipping . . . less breakage.

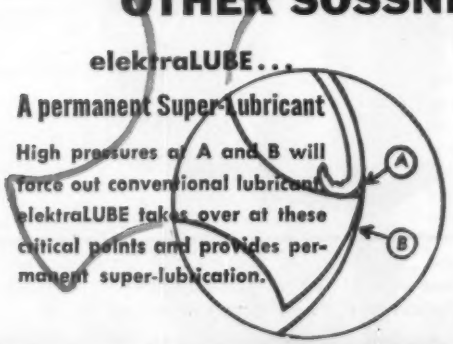
Triple Tempering, standard with Sossner, can make all the difference. Get FULL VALUE taps . . . Get SOSSNER.

OTHER SOSSNER EXCLUSIVES

elektraLUBE . . .

A permanent Super-Lubricant

High pressures at A and B will force out conventional lubricant. elektraLUBE takes over at these critical points and provides permanent super-lubrication.



SPIRAL TAPS . . .

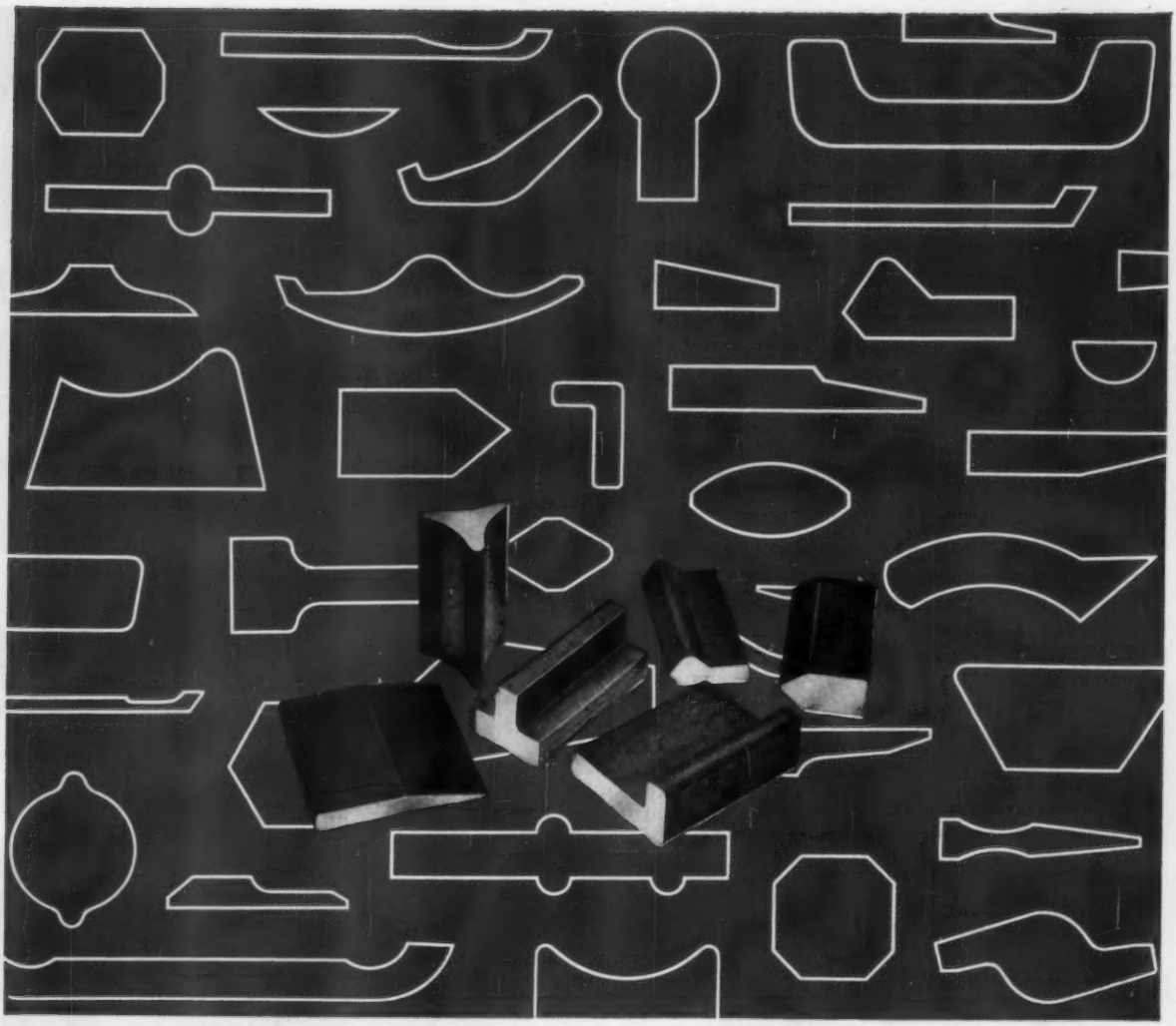
The most complete line

Regular Style	#4 thru 5/16"
Hook Style	#3 thru 5/16"
Three Flute Style	1/4" and 1/2"
Double Scoop Style	*Special Application*

SOSSNER TAP & TOOL CORPORATION
29 BROADWAY, LYNBROOK, L.I., N.Y.

Inquiries from representatives and distributors are invited.

FACTORY WAREHOUSES IN NEW YORK AND LOS ANGELES • DEALER STOCKS IN OTHER CITIES



Crucible special shapes

for better alloy steel parts at lower cost . . .

If you're machining intricate sections from solid bars—or using expensive forgings—stop! Choose instead, a *Crucible special shape* that approximates the finished part. *Crucible special shapes* eliminate rough-machining operations . . . reduce scrap losses.

There's practically no limit to the *special shapes* available at Crucible, in a wide variety of alloy steels. Rolls for over 400 special shapes are available—other shapes can be rolled to your specifications. Your local Crucible representative can give you the whole story of how *special shapes* can cut costs—save time. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

Visit us at Booth 354
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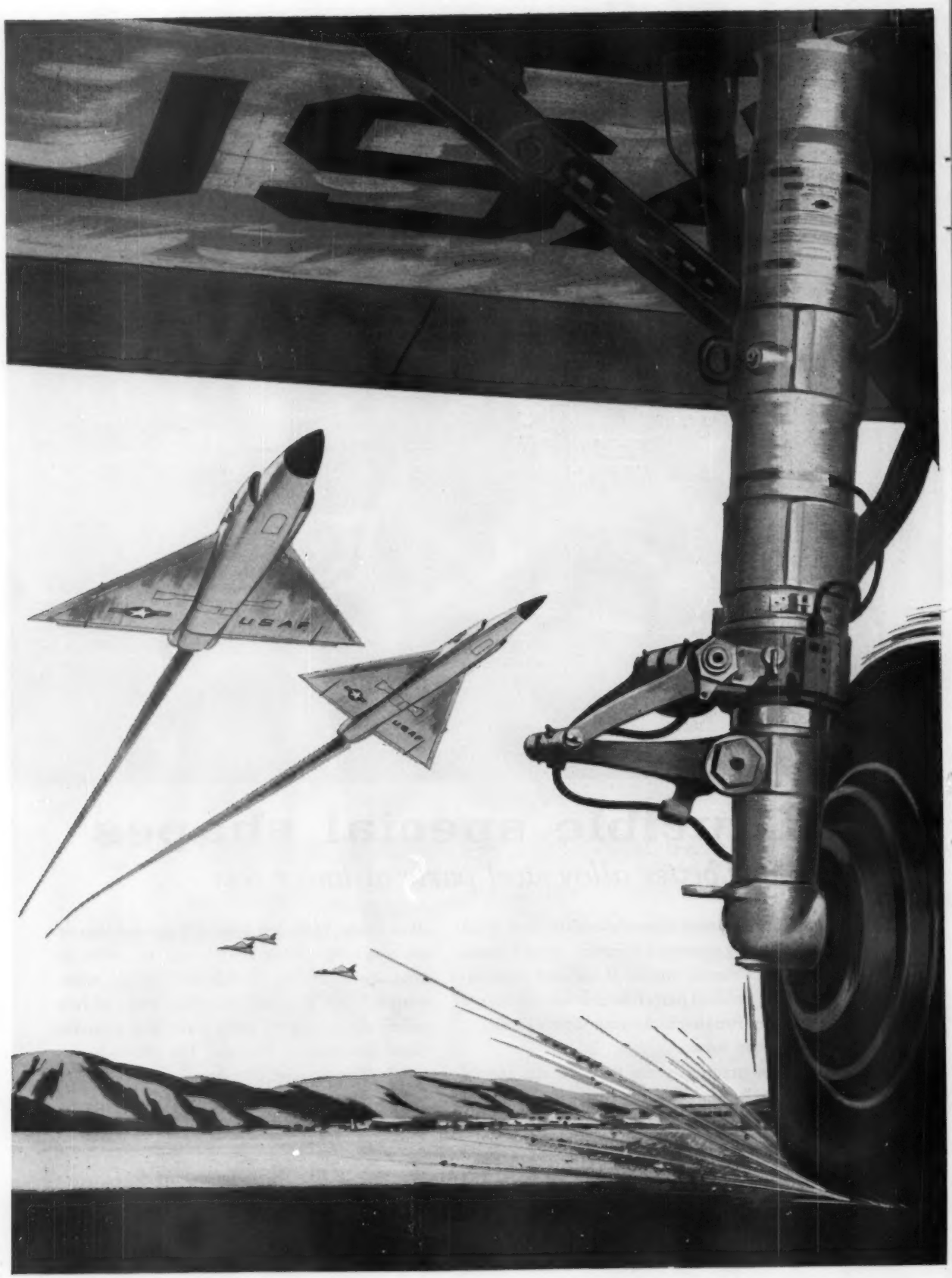
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TOUGH ENOUGH TO ABSORB JARRING HIGH-SPEED IMPACT...

IT'S A MENASCO LANDING GEAR, FORGED BY KAISER ALUMINUM

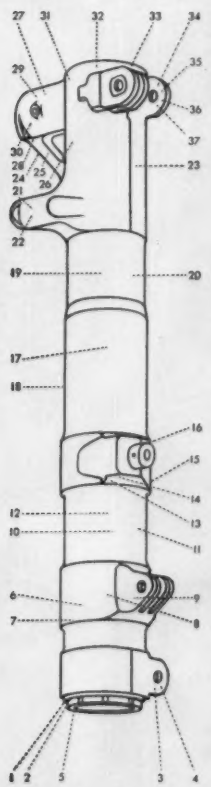
This landing gear forging, produced for Menasco and used on the Air Force's Convair F-102A jet interceptors, is proof of Kaiser Aluminum's ability to produce high quality forgings that not only meet exacting mechanical property specifications, *but often exceed them.*

For the best possible forgings, produced to meet or exceed actual strength requirements, think first of Kaiser Aluminum forgings.

For complete information, contact any Kaiser Aluminum sales office listed in your telephone directory. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office,* Palmolive Bldg., Chicago 11, Illinois; *Executive Office,* Kaiser Bldg., Oakland 12, California.

Kaiser Aluminum

Kaiser Aluminum Forging Meets or *Exceeds* Menasco Specifications on All 37 Test Bars



SPECIMEN LOCATION	TENSILE STRENGTH 1000 P.S.I.		YIELD STRENGTH 1000 P.S.I.		% ELONGATION IN 4 D	
	MENASCO SPEC. MM1752	KA TEST RESULTS	MENASCO SPEC. MM1752	KA TEST RESULTS	MENASCO SPEC. MM1752	KA TEST RESULTS
1	65	**75.6**	55	**71.5**	2	**2**
2	65	**77.0**	55	**72.5**	2	**3**
3	70	**71.1**	60	**64.4**	3	**3**
4	70	**71.4**	60	**64.6**	3	**3**
5	75	**80.8**	65	**72.3**	7	**8**
6	70	**76.4**	60	**68.8**	3	**4**
7	65	**72.4**	55	**63.6**	2	**4**
8	75	**83.7**	65	**73.9**	7	**7**
9	70	**75.2**	60	**64.3**	3	**8**
10	70	**71.3**	60	**60.0**	3	**6**
11	65	**71.0**	55	**67.0**	2	**4**
12	75	**82.2**	65	**72.0**	7	**13**
13	70	**74.2**	60	**65.8**	3	**3**
14	70	**75.2**	60	**70.2**	3	**3**
15	70	**73.4**	60	**68.2**	3	**3**
16	70	**75.3**	60	**66.0**	3	**6**
17	75	**82.2**	65	**72.1**	7	**10**
18	65	**71.6**	55	**64.2**	2	**4**
19	75	**78.6**	65	**69.4**	7	**8**
20	65	**66.5**	55	**59.0**	2	**3**
21	65	**70.4**	55	**63.2**	2	**3**
22	65	**71.1**	55	**65.0**	2	**3**
23	75	**78.7**	65	**69.0**	7	**8**
24	75	**79.6**	65	**66.9**	7	**10**
25	75	**80.0**	65	**69.0**	7	**10**
26	65	**70.0**	55	**64.2**	2	**2**
27	70	**73.6**	60	**66.3**	3	**4**
28	70	**74.0**	60	**65.3**	3	**3**
29	70	**73.2**	60	**68.4**	3	**3**
30	70	**72.9**	60	**65.2**	3	**4**
31	75	**78.4**	65	**67.2**	7	**8**
32	75	**81.1**	65	**71.1**	7	**10**
33	65	**70.0**	55	**64.4**	2	**2**
34	70	**71.7**	60	**63.6**	3	**3**
35	70	**72.1**	60	**64.5**	3	**4**
36	70	**78.9**	60	**68.8**	3	**7**
37	70	**77.5**	60	**68.4**	3	**6**

Here's how Menasco mechanical property specifications compare with final test results. Bold figures in chart show test bars where Kaiser Aluminum exceeds actual mechanical property specifications.

See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.

Stainless Steel
machining information . . .

*Use a heavy cut, but slow

MACHINING Stainless Steel isn't difficult—but it's *different*. Most grades of Stainless should be machined at about *half* the speed of carbon steel. This stems from the fact that Stainless is tough, rather than hard, and it tends to seize and gall at higher tool speeds.

Sharp tools are *essential*, especially for austenitic (300 series) Stainless Steels. Dull tools will work-harden and glaze the piece. In fact, the work-hardening may be so bad that future cutting will actually be impossible. A heavy, slow cut will give the best results with almost any grade of Stainless.

Trial and error is *not* the best way to master Stainless Steel machining. We suggest that you refer to U. S. Steel's "Stainless Steel Fabrication Book" for service-tested fabricating ideas. If you don't have a copy of this 130-page book, write for it on your company letterhead to United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

UNITED STATES STEEL CORPORATION, PITTSBURGH
AMERICAN STEEL & WIRE DIVISION CLEVELAND
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
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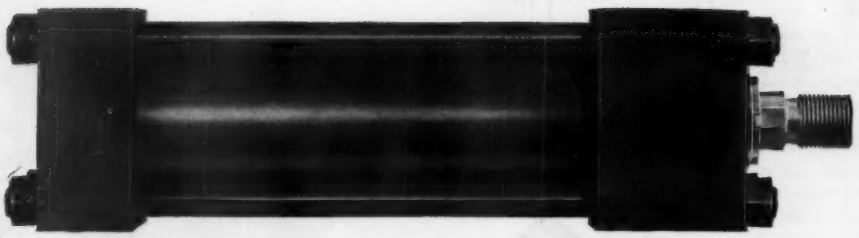
USS STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS
PIPE · TUBES · WIRE · SPECIAL SECTIONS

UNITED STATES STEEL

USS



designed for leadership!

The superiority of Hannifin cylinders begins on the drawing board, where Hannifin designers have originated feature after feature not found in other air and hydraulic cylinders. But it doesn't end there...

Hannifin offers more kinds of cylinders, more sizes, more mounting styles. Each manufactured with such exacting control of dimensions and finishes that it not only looks like a better cylinder—its performance proves it!

As more and more discriminating specifiers and buyers are finding, the extra quality you get from Hannifin costs you no more, can usually be delivered sooner.

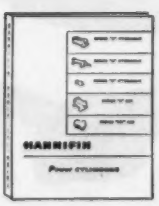
Why not specify Hannifin by name when you buy?

AIR AND HYDRAULIC

HANNIFIN

POWER CYLINDERS

Write for your copy of this new Hannifin Cylinder File—complete, easy-to-use, easy-to-order-from information on five lines of Hannifin cylinders. Hannifin Corporation, 517 South Wolf Road, Des Plaines, Illinois.



MUELLER BRASS CO. 600 SERIES BRONZE

the main working part in the smooth and OCEAN CITY SPINNING REELS

600 Series gears prove ideal in heavy duty salt water models 300, R300, and 320 in which corrosion resistance and high strength are important.

Other typical "600" applications

FORGED GEAR powerful

The Montague-Ocean City Rod & Reel Co. of Philadelphia is proud of the fact that many fishermen are calling their famous Ocean City "300" series spinning reels "the most dependable spinning reels in America." Such praise justifies the very best components in a product—like the corrosion-resistant Mueller Brass Co. "600" alloy gear. Provides its own shaft and has an integral clutch which takes the driving force from the handle, and incorporates a cam which provides the oscillating motion of the spool for cross-winding the line. Bronze was chosen because of the need for maximum strength, long wear, and because it is such an excellent bearing material. This application dramatically points up the valuable properties of Mueller "600" series alloys.

There are countless applications of Mueller "600" series bearing alloys. Find out how you can utilize one or more of them in YOUR products. Because forgings can be made closer to the finish size in "600" series alloys than can sand castings, there is less waste, greater speed in finishing.

● WRITE TODAY FOR THE ENGINEERING MANUAL YOU NEED

Mueller Brass Co. Forgings Engineering Manual H-58565 ☐

Tuf Stuf Aluminum Bronze Alloys Engineering Manual H-58563 ☐

600 Series Bearing Alloys Engineering Manual FM-3000 ☐

Copper Base Alloys in Rod Form Engineering Manual FM-3010 ☐

METALS AND ALLOY REVIEW

by FRANK M. LEVY

Vice-President and Director of Research

Recently Ray Engelgau, who heads our statistical quality control procedures, and Amos Armitage from our machining department met in my office and we had a very interesting discussion on our new "S-C" rod. The term "S-C" is derived from the fact that it is produced from billets that are cast semi-continuously. In addition, we use the letters "S-C" to indicate its "super cutting" qualities which is one of the outstanding characteristics of this rod. We have definitely proved these qualities in some very exhaustive tests, one of which I'd like to tell you about here.

Experience has shown that it is difficult to control dimensions within close tolerances on machine parts involving internal forming operations. Amos had run into exactly that trouble with a certain hydraulic fitting made from rod that required a fairly close dimensional tolerance on the internal formed diameter. So, we decided to make a comparison test by machining the part from rod made by the conventional method and from rod produced by the S-C process. When rod made by the conventional method was machined, the parts could not be held within the specified tolerance range. The same machine, the same tooling and the same machine operator were used in this test, and when S-C process rod was substituted, the machine parts were well within the required tolerance range.

In addition, I just received a letter from a well-known equipment manufacturer who has been running tests on S-C rod. They reported that the incidence of tool trouble per 1000 forgings machined from S-C rod were approximately half that of forgings made from conventional rod. We think that is pretty good evidence that the rod made by our semi-continuous process is exceptionally uniform by all standards. Incidentally, our new billet casting department is quite a model of automation and has a number of interesting processes and features. Anytime you happen to be in our area we would be more than happy to show you through and explain the many points of this process that gives us what we firmly believe to be the best possible rod available today which of course is reflected in the quality of our forgings.

If you would like a folder that fully covers our semi-continuous process, just drop me a note and I'll see that one is sent along to you promptly. In the meantime, we'd like to have you investigate our super-cutting S-C rod because we think it will improve your product quality—and we've got the alloys to do most anything to meet the most exacting demands.

Thanks for your time.

MUELLER BRASS CO.
PORT HURON 24, MICHIGAN

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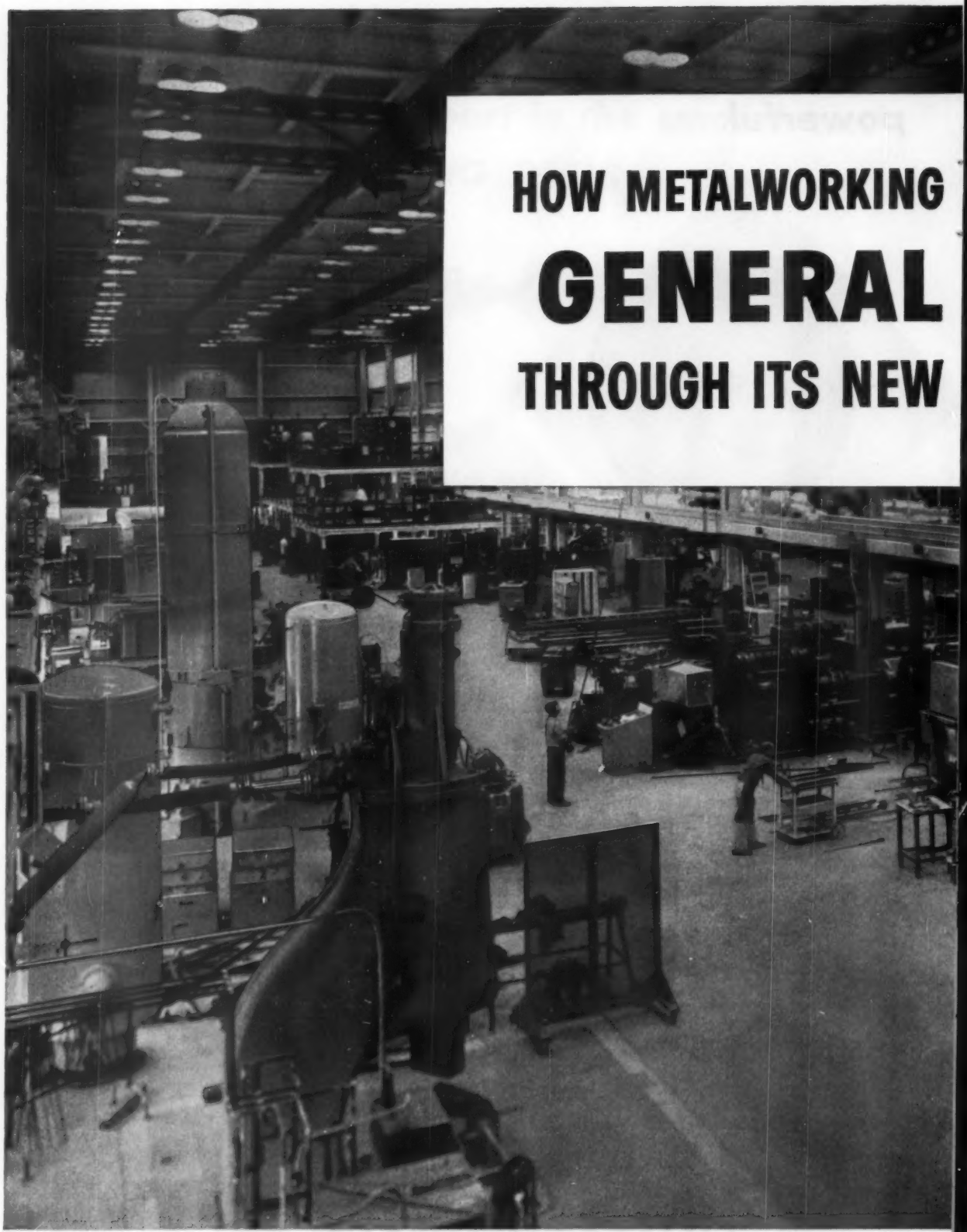


HOW METALWORKING GENERAL THROUGH ITS NEW

Laboratory with factory-size equipment—that's the new $5,000,000 G-E metals and ceramics laboratory in Schenectady. From here will come many of the products manufactured by the Metallurgical Products Department of General Electric Company, 11149 E. 8 Mile Road, Detroit 32, Michigan.

BENEFITS FROM THE RESOURCES OF

ELECTRIC

METALLURGICAL PRODUCTS DEPARTMENT

Solutions to your most pressing problems, plus developments ahead of industry trends, are now being worked out in our laboratories

It doesn't take a crystal ball to know what role cutting tools will play in the Metalworking Industry in the future. The signs are unmistakable.

More accurate casting, extruding, and forging techniques will mean that less metal must be removed by machining. And this will mean that cutting tools must take thinner cuts, and hold closer tolerances.

New and more automatic machine tools will mean that cutting tools must operate at higher speeds – yet provide the longer tool life necessary to give you maximum benefits from automation.

General Electric, through its new Metallurgical Products Department (successor to the Carboloy Department), has already developed several cutting tool materials that are ahead of these trends.

Three years ago, the first of the three Carboloy® Series 300 carbides was announced. Today, these grades permit you to cut harder steels, at higher speeds . . . at lower machining cost per part.

Two years ago, General Electric researchers introduced Cemented Oxide. This material puts mirror finishes on metal, while operating at speeds up to 3000 fpm – far beyond the range of carbides and ceramics.

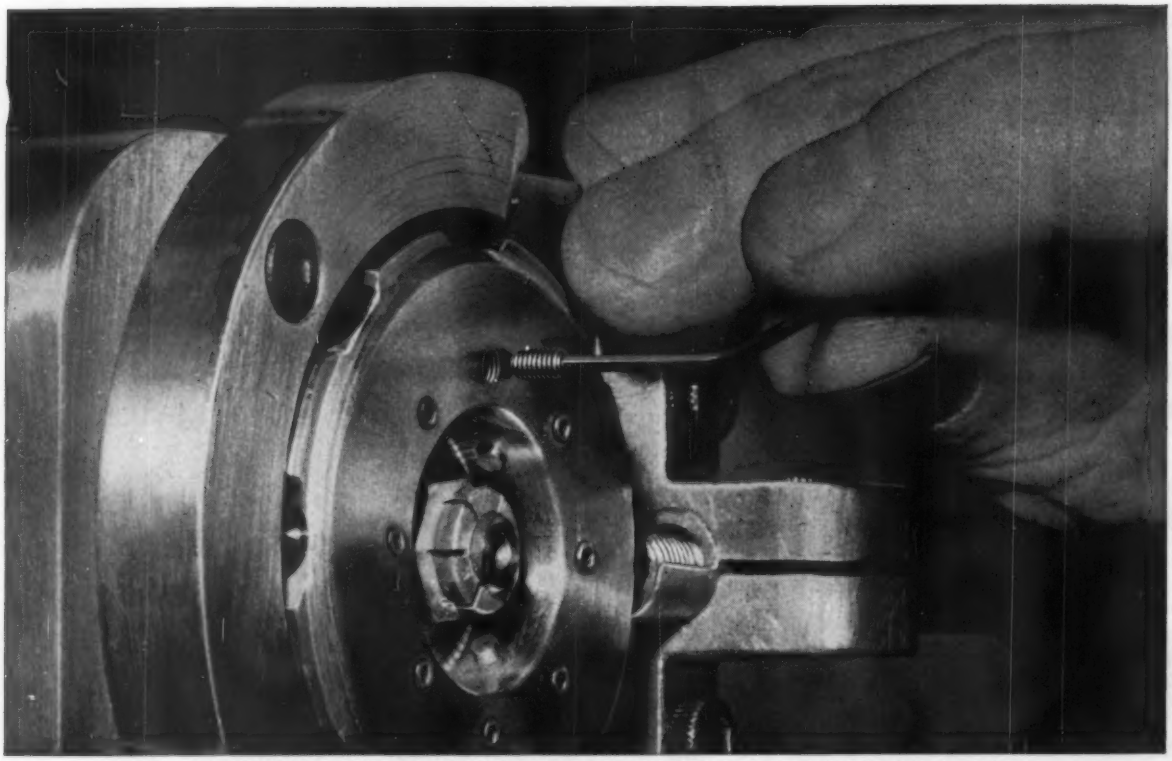
And last year, G-E Engineers in the Carboloy Machinability Laboratory developed several new machining techniques to help you make better use of these improved materials. One of these techniques lead to a way to utilize carbides at low speeds – starting from 0 fpm – an almost impossible task until now.

All these developments resulted from the vast technological resources which General Electric has brought to bear on metalworking problems – plus the fund of machining knowledge accumulated since G-E first introduced carbides to American industry in 1928.

These resources and this knowledge mean that General Electric–through its Metallurgical Products Department–will be able to recognize and solve new problems of the Metalworking Industry as they arise.

Progress Is Our Most Important Product

GENERAL ELECTRIC



Microsize UNBRAKO socket screws simplify design problems—even in highly specialized equipment like this prototype precision loading device for use in advanced automated production operations.

Miniaturize with UNBRAKO set screws

HEAT-TREATED ALLOY STEEL*
PLAIN CUP POINT
Class 3 Fit Standard

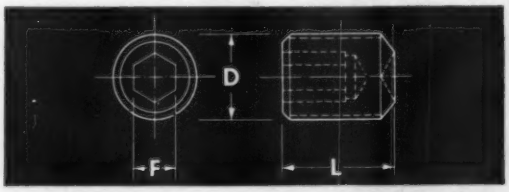
Diameter	Threads per inch NC	Threads per inch NF	L Overall Length	Recommended Installation Torque in Inch-Pounds NC	Recommended Installation Torque in Inch-Pounds NF	Weight per Box of 100 in Pounds
	..	80	1/16	..	.5	.01
	..	80	5/64	..	.5	.01
#0 D .060 F .028	..	80	3/32	..	.5	.01
	..	80	7/64	..	.5	.01
	..	80	1/8	..	.5	.01
	..	80	1/4	..	.5	.01
	..	72	1/16	..	1.5	.02
	..	72	5/64	..	1.5	.02
#1 D .073 F .035	..	72	3/32	..	1.5	.02
	..	72	7/64	..	1.5	.02
	..	72	1/8	..	1.5	.02
	..	72	1/4	..	1.5	.02
	56	..	1/16	1.5	..	.03
	56	..	5/64	1.5	..	.03
#2 D .086 F .035	56	..	3/32	1.5	..	.03
	56	..	7/64	1.5	..	.03
	56	..	1/8	1.5	..	.03
	56	..	1/4	1.5	..	.03
	48	..	5/64	5.0	..	.04
	48	..	3/32	5.0	..	.04
#3 D .099 F .050	48	..	7/64	5.0	..	.04
	48	..	1/8	5.0	..	.04
	48	..	1/4	5.0	..	.04

*Also available in stainless steel

You need not design special set screws to secure your new miniaturized equipment. Microsize UNBRAKOS were developed specifically for use in modern small devices.

UNBRAKO screws are made of carefully selected alloy steel. They are manufactured to timepiece precision. Sockets are deep and uniform for greatest wrench engagement and longest reuse. Threads are fully formed for maximum strength and exact fit. And UNBRAKOS are heat treated to the optimum condition for high tensile strength and ductility without brittleness or decarburization.

Ask your authorized industrial distributor about microsize UNBRAKO socket screws today. Or write us for Bulletin 2055 and samples. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 1, Pa.



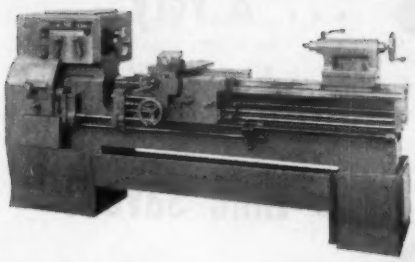
STANDARD PRESSED STEEL CO.

UNBRAKO SOCKET SCREW DIVISION SPS JENKINTOWN PENNSYLVANIA

LeBlond Sliding Bed Gap Lathes

The most versatile lathes in the world

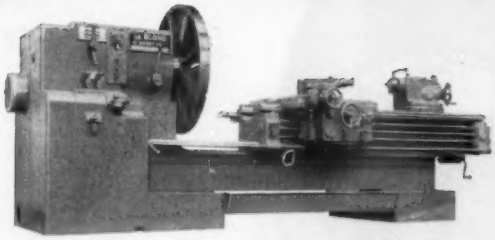
17"/28" — *Regal*



For turning a variety of parts—particularly the unpredictable extremes you encounter in maintenance and job shop work, LeBlond Sliding Bed Gap Lathes are unsurpassed. At left is the 17"/28" Regal, smallest of the four LeBlond Sliding Bed Gap Lathes.

Major features, 17"/28" Regal: Hardened and ground replaceable steel bed ways. Combination gear-belt drive headstock. 12 spindle speeds, 48 feeds and threads. Both feed rod and leadscrew. 3 bearing spindle. *Write for Bulletin RG-210-A.*

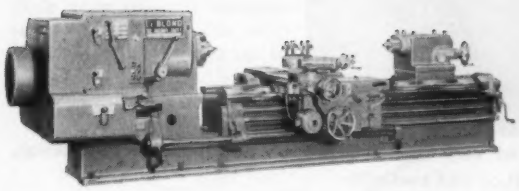
16"/38" — *Heavy Duty*



With bed closed, LeBlond Sliding Bed Gap Lathes function as regular engine lathes. The special bed slides open to form a gap that will accept odd-shaped parts and large diameter work. This also provides greater bed length, more than 50% greater distance between centers.

Major features, 16"/38" Heavy Duty: Combination gear-belt drive provides a complete speed range from 16 to 2000 rpm. 4-way power rapid traverse. New spindle mounting for safe high speeds. Hardened and ground bed ways. *Write for Bulletin SBG-104-A.*

25"/50" and 32"/60" — *Heavy Duties*



Seventy years of LeBlond experience in solving day-by-day turning problems, extensive laboratory research and practical ideas from our own shop combine to give Sliding Bed Gap Lathes features to meet your turning requirements for years to come.

Major features, 25"/50" and 32"/60" Heavy Duties: 36 speeds at high power. 4-way power rapid traverse. Automatic lubrication in the headstock, quick change box and apron. Hardened and ground bed ways. Anti-friction bearings throughout. *Write for Bulletin SBG-106-A.*

The R. K. LeBlond Machine Tool Company

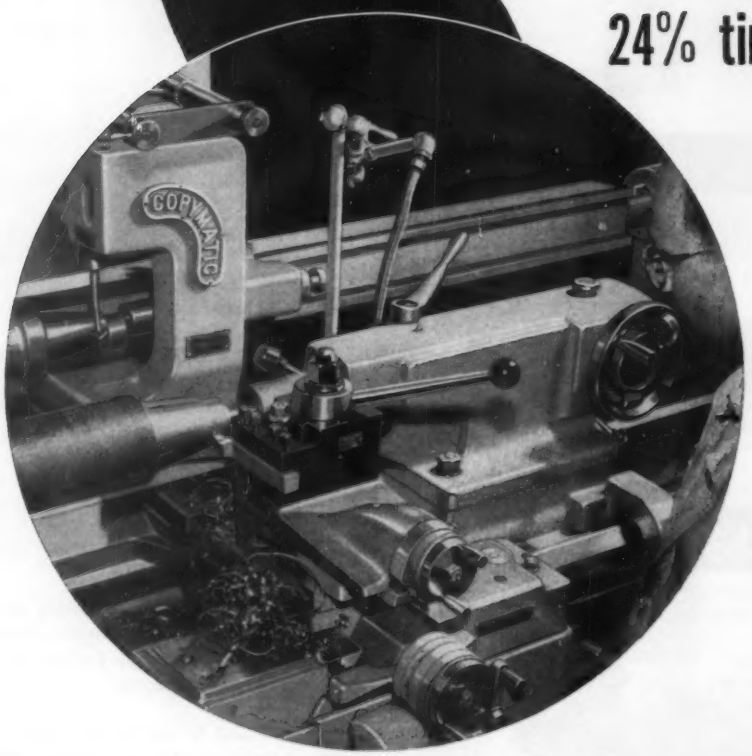
Cincinnati 8, Ohio

LeBLOND of Cincinnati

World's largest builder of a complete line of lathes for more than 70 years

straight from the horse's mouth:

..."a very good machine... 24% time saved!"



When a famous machine tool manufacturer reports on the performance of another's product, it is an opinion you can count on as authoritative.

The Ingersoll Milling Machine Company of Rockford, Illinois is one of the early owners of a new Lodge & Shipley 16" POWERTURN 90° COPYMATIC Lathe. Used in turning cutter housings and shanks, shafts and spindles, the lathe has proved very good, judged on performance, construction, accuracy and versatility.

If you want eye-witness proof of similar significant savings on *your* lathe production, the Lodge & Shipley Demonstration Room is at your service. Contact your Lodge & Shipley distributor for details or write direct to: The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

JOB FACTS

WORKPIECE: 4" Diameter Cutter Housing
OPERATION: Turn complete including taper
MATERIAL: 4140 HR Steel
CUTTING TOOLS: Carbide
FEED: .018" per rev.
SPEED: 431 RPM
TIME: Floor-to-Floor: approx. 35 min.
RESULTS: 24% time saved

Lodge & Shipley

The formed metal stamping illustrated above is produced complete on the U. S. No. 33 Multi-Slide Machine shown below.

ON FORMED STAMPINGS REDUCE COSTS WITH U. S. MULTI-SLIDES®

If you produce formed metal stampings, the U. S. Multi-Slide may be the answer to your cost reduction problems. The part illustrated is just one of the many different types of stampings that can be produced complete on the U. S. Multi-Slide — without secondary handlings . . . and every such operation that can be eliminated increases your profit potential.

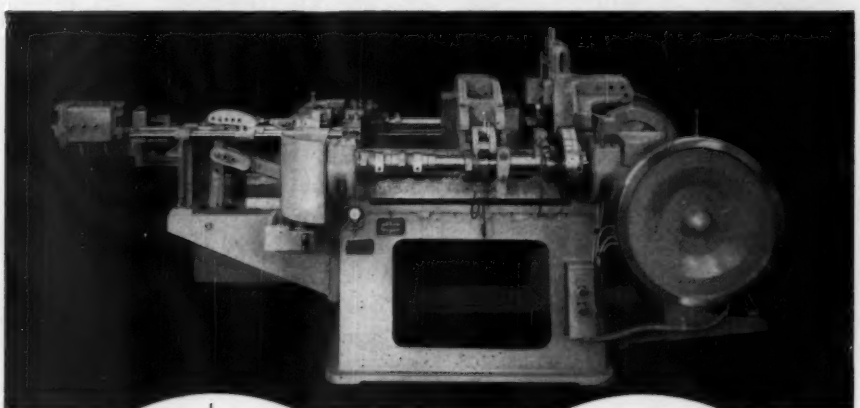
The combination of ram action, four-slide forming, vertical stripper and various auxiliary units allows for the designing of tools to produce intricate parts complete — without secondary operations. Since these movements are an integral part of the machine equipment, it is not necessary to incorporate complicated movements into the dies themselves, thereby giving the added advantage of reduced tool maintenance cost.

Investigate! Ask for a copy of Bulletin 15-A, or send us part drawings or samples for our recommendations.

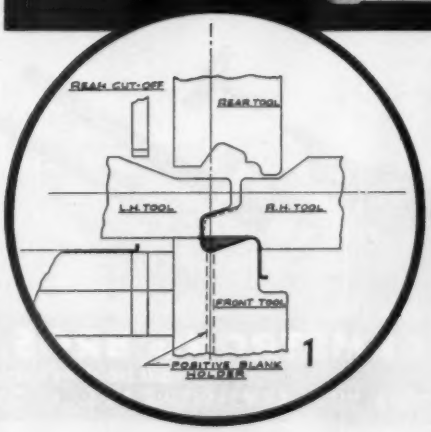
U. S. TOOL COMPANY, Inc.

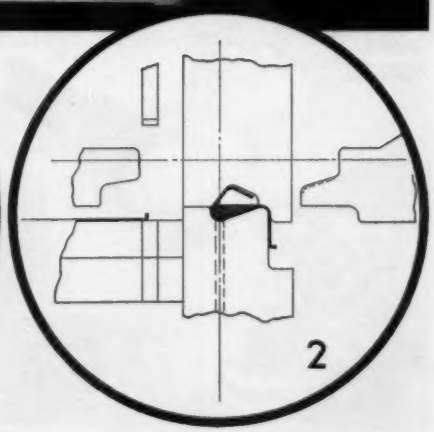
AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides — U. S. Multi-Millers — U. S. Automatic Press Room Equipment — U. S. Die Sets and Accessories



Right: The No. 33 U. S. Multi-Slide with capacity for material up to 2½" wide, with feed length adjustable up to 12½".





Right: Operations in the forming position. 1 — Front, right-hand and left-hand tools entered to preform part around post. 2 — Right-hand and left-hand tools retracted; front and rear tools entered to complete the form.

ARMSTRONG

Quality TOOLS

More than meets the eye

There are extra values in ARMSTRONG TOOLS that become apparent only with use.

TOOL SENSE— convenience in use — the most efficient *"tool approach"* built into ARMSTRONG Tool Holders; the balance and *"feel"* of an ARMSTRONG Wrench; the *rigidity* of ARMSTRONG "C" Clamps; the extra *toughness* of ARMSTRONG Lathe Dogs and Eye Bolts; the universal *adaptability* of ARMSTRONG Set-up and Hold-down Tools — the evidence of "tool sense", the understanding of each tool's requirements.

STRENGTH — built into each individual ARMSTRONG TOOL is a safety factor of extra *strength* — *strength* beyond any need, the inherent strength of specially selected materials enhanced by proper heat treatment and hardening.

UNIFORM QUALITY — the uniform quality made possible by modern manufacturing methods, in a specially-built plant equipped with every needed quality control. The name ARMSTRONG with the Arm-and-Hammer Trade Mark is universally recognized as a guarantee of finest quality.

ARMSTRONG BROS. TOOL CO.

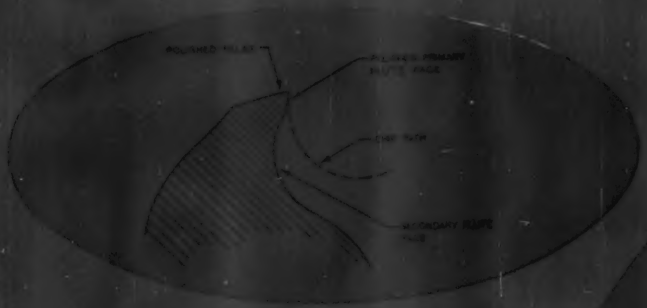
"The Tool Holder People"

5215 WEST ARMSTRONG AVE. • CHICAGO 30, ILLINOIS

NEW! WELDON *Ski-Kut* END MILLS

FOR CUTTING ALUMINUM

PATENT APPLIED FOR



CUTTING ALUMINUM MADE EASIER, SMOOTHER AND FASTER

The primary flute face of the Ski-Kut End Mills, being narrow, definitely minimizes adherence of chips to the flute faces. Adherence or welding of aluminum chips contributes in a major degree to the difficulty in milling aluminum.

Greater feeds, longer tool life, better finish, easier operation of equipment are some of the advantages to be gained by the use of Weldon Ski-Kut End Mills for cutting aluminum.

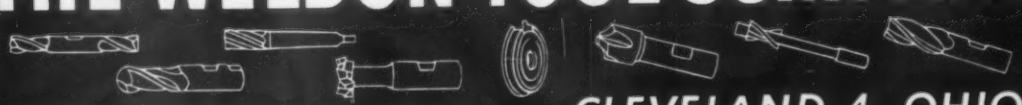
1. Minimizes adherence of Chips to Flute Faces
2. Increased Shearing Action(45° Helix Angle)
3. Hammering Effect Practically Eliminated
4. Greater Feeds
5. Longer Tool Life
6. Better Finish
7. Easier Operation
8. Less Horsepower Required

A RADICALLY NEW DEVELOPMENT IN END MILL DESIGN FOR CUTTING ALUMINUM THAT SPEEDS PRODUCTION AND REDUCES COST.

Weldon SKI-KUT End Mills are available from stock in size from 1/4" to 2" in various lengths. For full information write for folder SKM-1

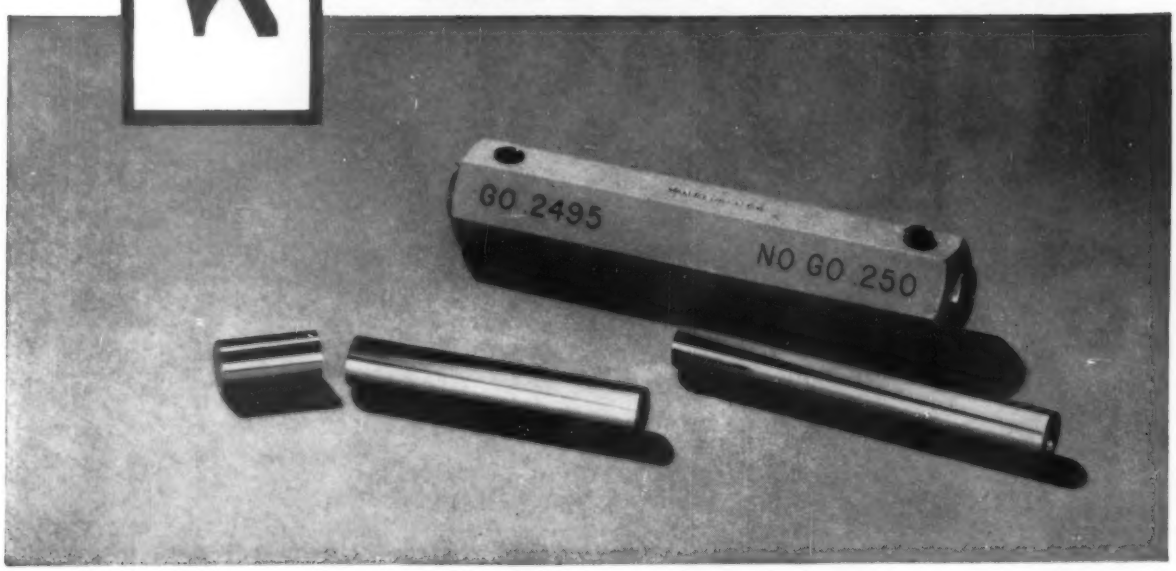
Weldon Distributors throughout U. S. A. and Canada carry complete stocks to serve you.

THE WELDON TOOL COMPANY



3000 WOODHILL ROAD · · · CLEVELAND 4, OHIO

VK WIRE TYPE PLUG GAGES



VASTLY LONGER-LIVED *and* MONEY SAVERS...
because they're "Cut-Off-Able" as well as "Reversible"

As a Van Keuren agent put it, "They're not only reversible, they're cut-off-able." And that means when you buy Van Keuren Wire Type Plug Gages, the sizes below 3/8" may be cut off when ends become worn and as many as from five to ten gages made available from the 1 7/8" and 2" long units. It is not only economical and practical to use Van Keuren Gages but it is a very simple operation to cut off the ends by following instructions furnished on request. The illustration above shows clearly the cut-off and reversible features.

VK Wire Type Gages are available in ZZ to XXX accuracies in sizes from .001" to 1.000". They are furnished in alloy tool steel, high speed steel, chromium plate or tungsten carbide. Whatever the gaging job, the extra length provided in VK units will save you money. It will also pay you to take advantage of VK deliveries. In many cases we can ship your requirements from stock.

VK Wire Type Plug Gages are fully described in Catalog & Handbook No. 36, available on request.

Send for a copy of the new, 258-page Van Keuren Catalog and Handbook No. 36 containing valuable technical and engineering information on measuring problems and methods. Address:

VK

38th YEAR

THE Van Keuren CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Optical Flats . . . Light Wave Equipment . . . Light Wave Micrometers . . . Gage Blocks . . . Wire Type, Taperlock and Trilock Plug Gages . . . Master Setting Disks . . . Thread Measuring Wires . . . Gear Measuring Wires . . . Carbide Plug Gages . . . Carbide Pivots . . . Precision Lapping Service.

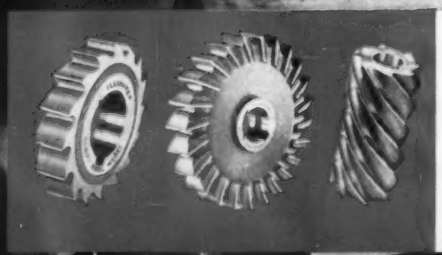
Skilled Hands Deserve

ILLINITE® MILLING CUTTERS

available from your **ILLINITE** *distributor:*

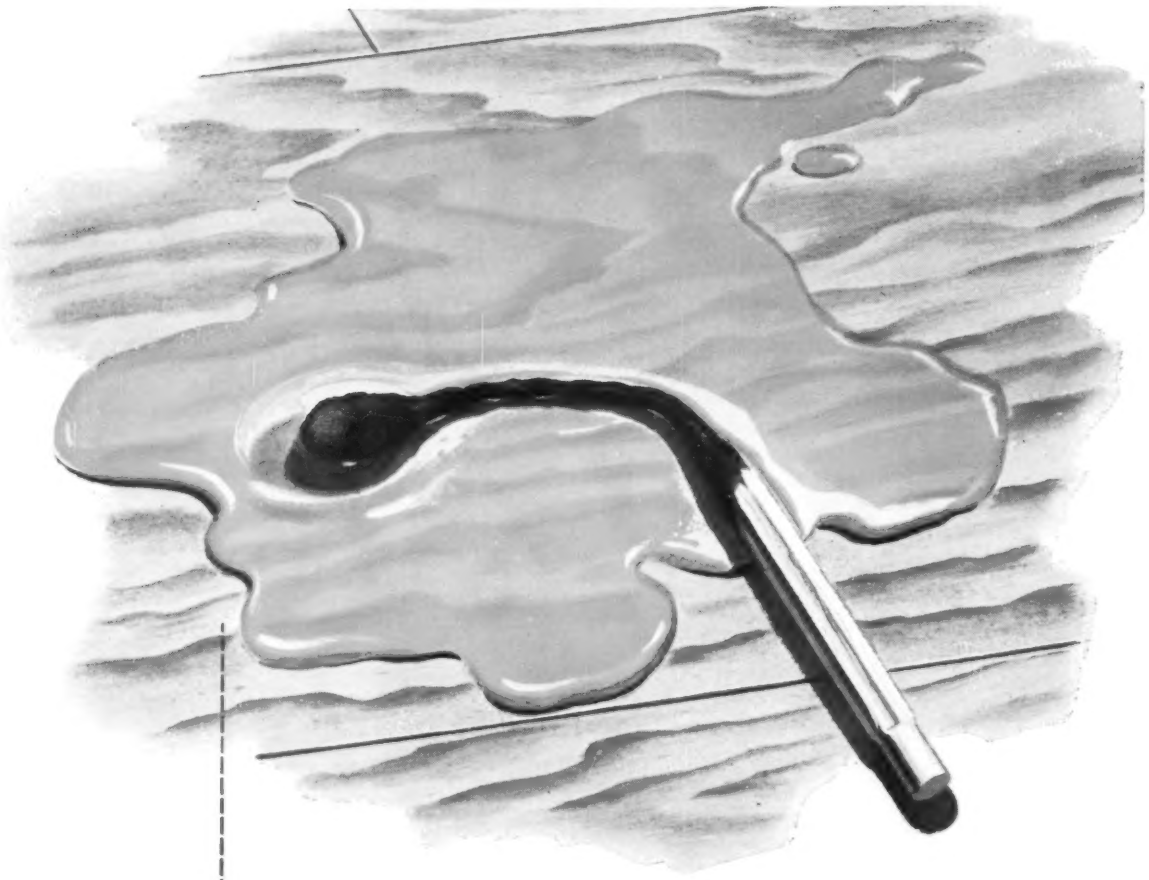
STANDARD MILLING CUTTERS FROM STOCK
SPECIAL MILLING CUTTERS TAILORED TO THE JOB

Today's expert workmen get the most out of modern, high speed production machines by using the finest metal cutting tools . . . Illinite Milling Cutters. Your Illinite distributor offers off-the-shelf availability on standards, prompt service on made-to-order specials. He offers a complete service in metal cutting tools of high uniformity, long life and fine finish . . . tools that have made Illinois Tool Works a recognized metal cutting tool leader for nearly fifty years. Call him today for fast, complete metal cutting tool service! You'll be glad you did.



ILLINITE®
Metal Cutting Tools
DIVISION OF ILLINOIS TOOL WORKS
2501 N. Keeler Ave., Chicago 39, Illinois

itw



An economical hydraulic fluid that actually snuffs out fire!

WHEREVER a fire hazard exists near a hydraulic system, you can greatly reduce this hazard without excessive costs by specifying Shell Irus Fluid 902. This new hydraulic fluid is a "snuffer" type fluid with water dispersed in oil.

Because Irus* Fluid 902 is economical, many plant operators have found they save thousands of dollars yearly when the changeover is made. And they obtain performance which is unsurpassed by much higher priced fire-resistant fluids.

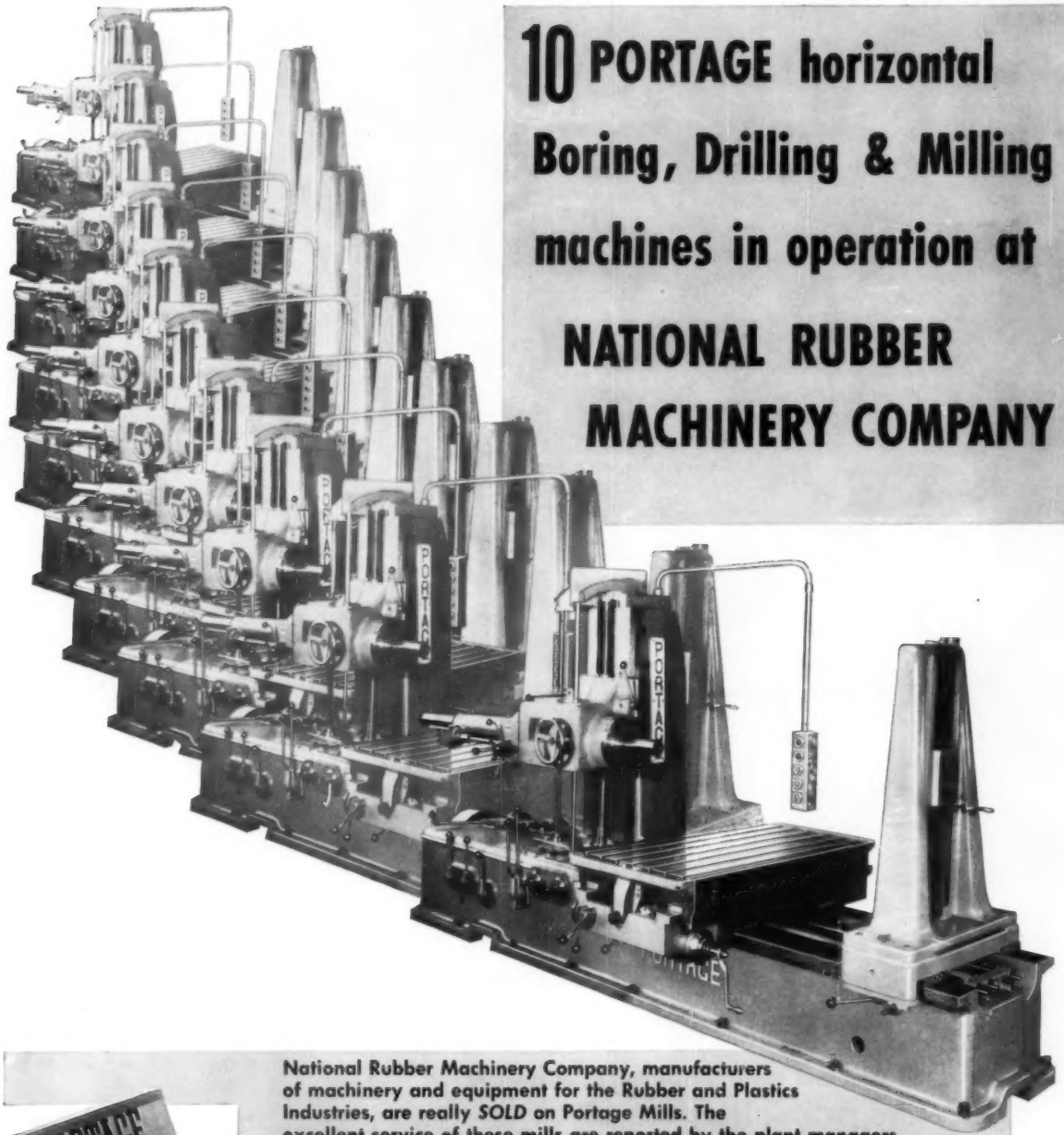
For complete information on Shell Irus Fluid 902 write to Shell Oil Company, 50 West 50th Street, New York 20, N. Y., or 100 Bush Street, San Francisco 6, California.

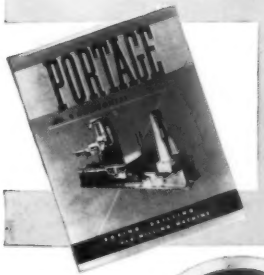
*Trademark

SHELL IRUS FLUID 902

SHELL

10 PORTAGE horizontal Boring, Drilling & Milling machines in operation at NATIONAL RUBBER MACHINERY COMPANY





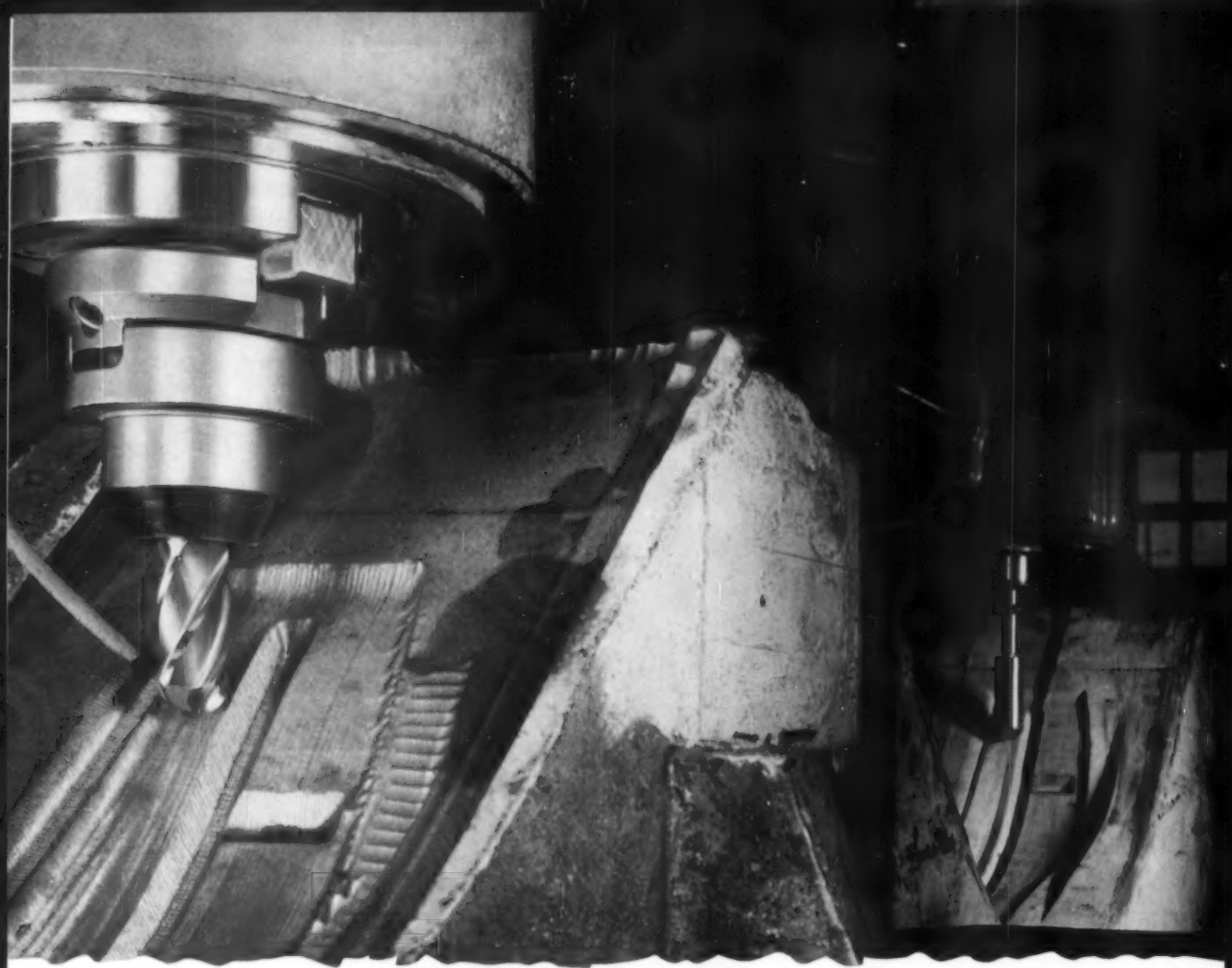
National Rubber Machinery Company, manufacturers of machinery and equipment for the Rubber and Plastics Industries, are really *SOLD* on Portage Mills. The excellent service of these mills are reported by the plant managers at Columbiana, Ohio and the Akron Division plant. This large installation certainly represents a vote of confidence for the performance of Portage Mills . . . and speaking of confidence . . . many leading manufacturers have come to realize that the ruggedness, versatility and low maintenance cost of Portage Mills makes them the best buy . . . and remember . . . their initial capital investment cost is less, without the sacrifice of quality. Write for complete information . . . TODAY.

THE Portage MACHINE CO.

1026 Sweitzer Avenue • Akron 11, Ohio

Representatives in Principal Cities

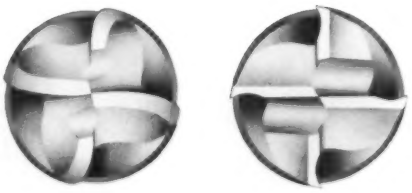
BUILDERS OF PRECISION MACHINE TOOLS, SPECIAL AND PRODUCTION MACHINERY SINCE 1916



EFFICIENT MILLING...*in any direction!*

New CLEVELAND 4-flute center cutting End Mills reduce individual end tooth shock and assure smoother cutting action, particularly in plunge milling.

The advanced design of 4-flute 500 Series High Speed End Mills is your assurance of *accuracy* and *high production* in both tracer and general purpose milling. The accurately form-ground notches and the precision ground cutting edges give you absolute uniformity and *positive chip removal.* Try these new CLEVELAND End Mills on your next job. Get all the advantages of 4-flute mills *and plunge cutting, too!* Contact our nearest Stockroom, or . . .



BALL NOSE SQUARE END

In both the ball nose and square end types, the rake angle is uniformly progressive from zero at dead center to blend with the hook in the cutting face of the flutes.

TELEPHONE YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

THE CLEVELAND TWIST DRILL CO.

1242 East 49th Street • Cleveland 14, Ohio

Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 2 • San Francisco 5 • Los Angeles 58

E. P. Barrus, Ltd., London W. 3, England

Instantly—the right speed for cutting any metal

with the

WALKER-TURNER

16" VARIABLE-SPEED

BAND SAW

Just turn this wheel for any speed wanted— 50 to 4500 sfm — while saw is running!

With its quick-change, variable speed drive, this Walker-Turner 16" Band Saw can be adjusted instantly, *while the machine is running,* to the correct cutting speed for any metal —even tough steel. Speed changes are fast, smooth and safe —as easy as dialing a radio. There's no lost production time for belt or pulley changes and an indicator shows the exact cutting speed.

In addition, this versatile "Light-Heavyweight" is priced surprisingly low and features big capacity, adjustable saw guides, quick-change Carter Jiffy Tires, and strong construction. For a demonstration, call your W-T distributor. He's listed under "Tools" in your classified telephone directory.

WALKER-TURNER PORTABLE BLADE WELDER
Available at extra cost. ¾" blade capacity. Pays for itself quickly in savings through use of coiled blade stock.

walker-Turner

MAIL COUPON FOR COMPLETE DETAILS!

WALKER-TURNER
Division of Rockwell Manufacturing Co.
Dept. WC-21, 400 N. Lexington Ave., Pittsburgh 8, Pa.

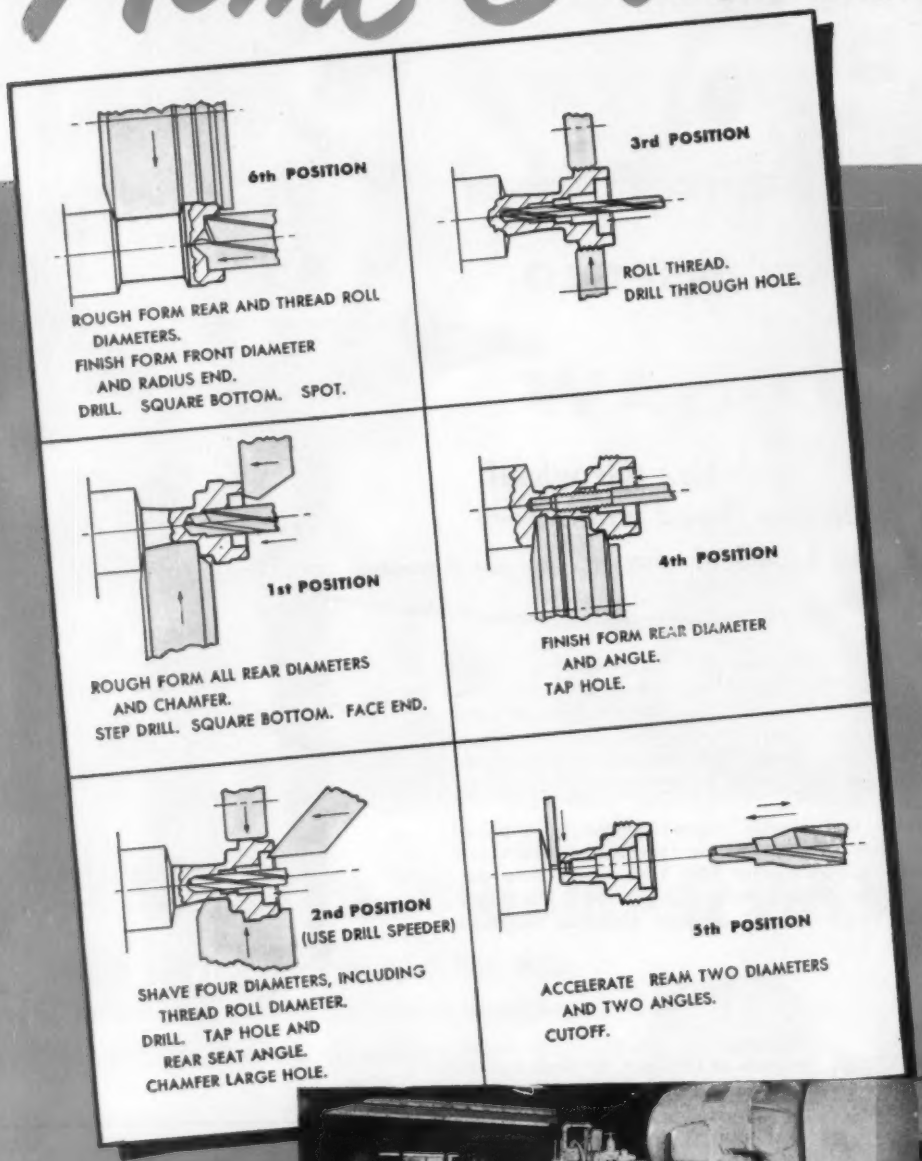
☐ Please send name of my Walker-Turner distributor.
☐ Please send literature on Walker-Turner Band Saws.

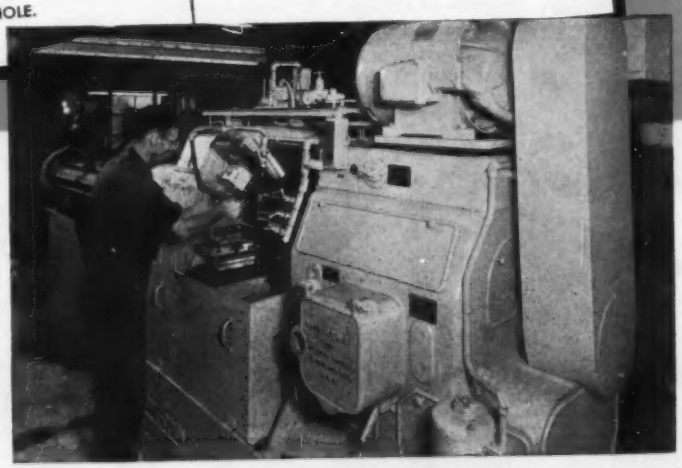
Name_____

Address_____

City_____ Zone_____ State_____

Acme-Gridley


6th POSITION
ROUGH FORM REAR AND THREAD ROLL DIAMETERS.
FINISH FORM FRONT DIAMETER AND RADIUS END.
DRILL. SQUARE BOTTOM. SPOT.
3rd POSITION
ROLL THREAD.
DRILL THROUGH HOLE.
1st POSITION
ROUGH FORM ALL REAR DIAMETERS AND CHAMFER.
STEP DRILL. SQUARE BOTTOM. FACE END.
4th POSITION
FINISH FORM REAR DIAMETER AND ANGLE.
TAP HOLE.
2nd POSITION
(USE DRILL SPEEDER)
SHAVE FOUR DIAMETERS, INCLUDING THREAD ROLL DIAMETER.
DRILL. TAP HOLE AND REAR SEAT ANGLE.
CHAMFER LARGE HOLE.
5th POSITION
ACCELERATE REAM TWO DIAMETERS AND TWO ANGLES.
CUTOFF.



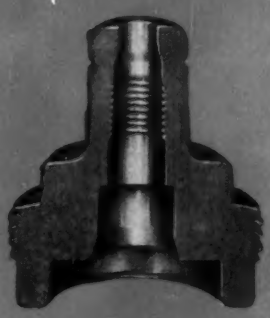
The operator, Clarence Tyler, also is happy with his Acme-Gridley. Tooled to complete one piece every 11¾ seconds, the machine can maintain that speed for as long as 16 hours before it is necessary to regrind tools.

gives NESS, INC. important production bonuses

Purchased primarily to eliminate secondary operations, this Acme-Gridley Six Spindle Bar Automatic has given a good account of itself in many other ways.

Says G. C. Pfrengle, General Manager of NESS, INC., "This 1¼" Acme-Gridley Six Spindle Automatic came into the shop and immediately went into production, without an extended 'get acquainted period'—notwithstanding the fact that we had not run this type of automatic previously. It has been completely satisfactory; we are especially pleased with the tool life and stability of the machine, which has resulted in a minimum of down time. And, since we are able to complete the part without secondary operations, costing is improved."

Owners of Acme-Gridleys will recognize immediately that the "*tool life and stability of the machine*," about which Mr. Pfrengle comments, is the result of plenty of "beef", properly distributed—a basic design principle of all Acme-Gridleys.



JOB FACTS

PRODUCED BY: Ness, Inc., multiple operation specialists in the production of automatic screw machine products, emphasizing close tolerances.

PART.....Bushing
MATERIAL.....B-1113 Steel
MACHINE TIME.....11¾ Seconds
NUMBER OF OPERATIONS.....14

INDEX... to lower machining costs... with Acme-Gridley CONTROLLED CYCLE

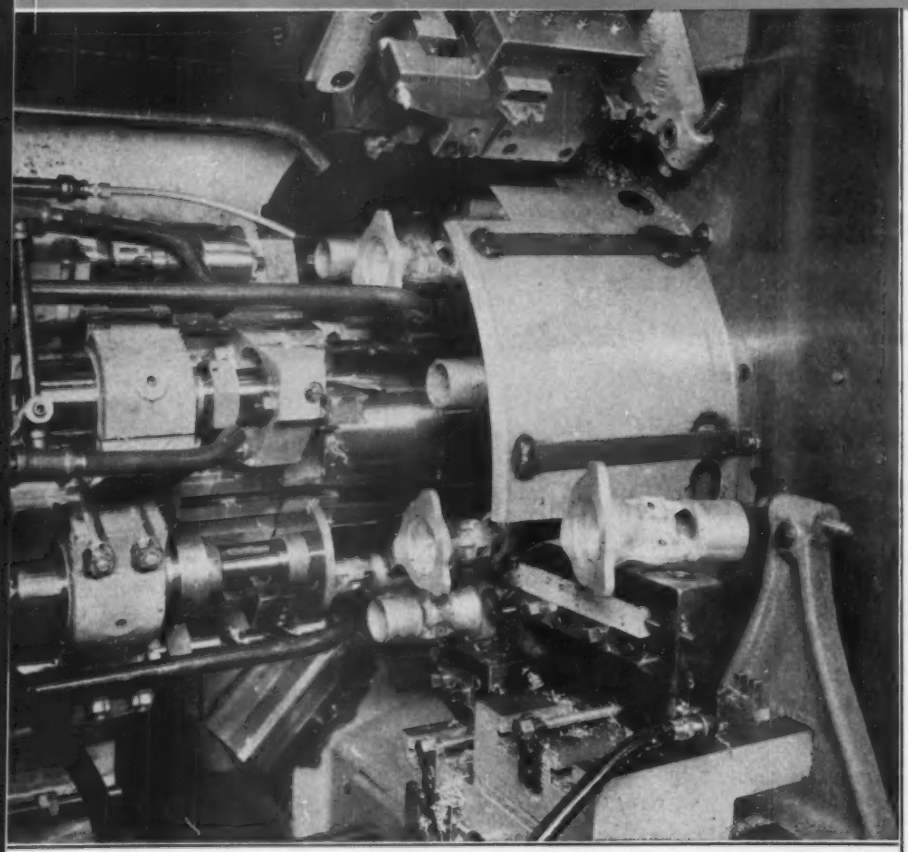
National Acme

THE NATIONAL ACME CO.
171 EAST 131ST STREET
CLEVELAND 8, OHIO

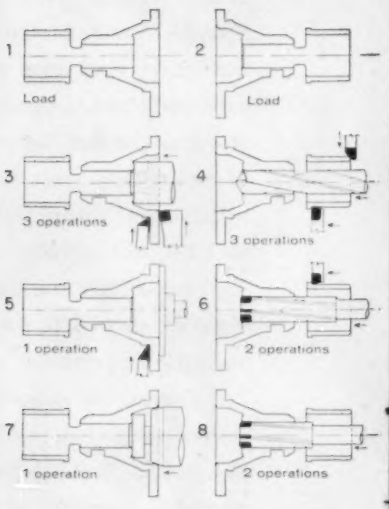
Sales Offices... Newark, N. J.... Detroit, Mich.... Chicago, Ill.

Acme-Gridley

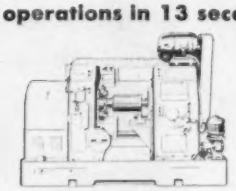
RPA-8 SPINDLE CHUCKER



BASKET HUB
ALUMINUM DIE CASTING
Double indexing—both ends completed at one setup on 6" RPA-8 Acme-Gridley Chucking Automatic.



12 operations in 13 seconds



SPEEDS PRODUCTION . . .

eliminates special machine investment

When it became necessary to replace the special machine on which this washing machine basket hub had been produced, the production engineer chose an Acme-Gridley eight spindle chucker. His choice was based on two factors: lower initial investment than that required by the special machine; greater adaptability of the Acme-Gridley with proper tooling to handle many such jobs that otherwise would require special equipment.

Acme-Gridley 8-spindle automatic chucking machines give you maximum production at lowest cost per piece because of greater tooling flexibility, double indexing that permits finishing both ends of the piece at one time, and comprehensive tooling engineering that comes only from COMPLETE LINE experience.

Write today for
Bulletin Nos. CM-44 and CM-51A

INDEX . . . to lower machining costs . . . with *Acme-Gridley* **CONTROLLED CYCLE**

National Acme

THE NATIONAL ACME CO.
171 EAST 131ST STREET
CLEVELAND 8, OHIO

Sales Offices . . . Newark, N. J. . . . Detroit, Mich. . . . Chicago, Ill.

You can't do better than go

100%

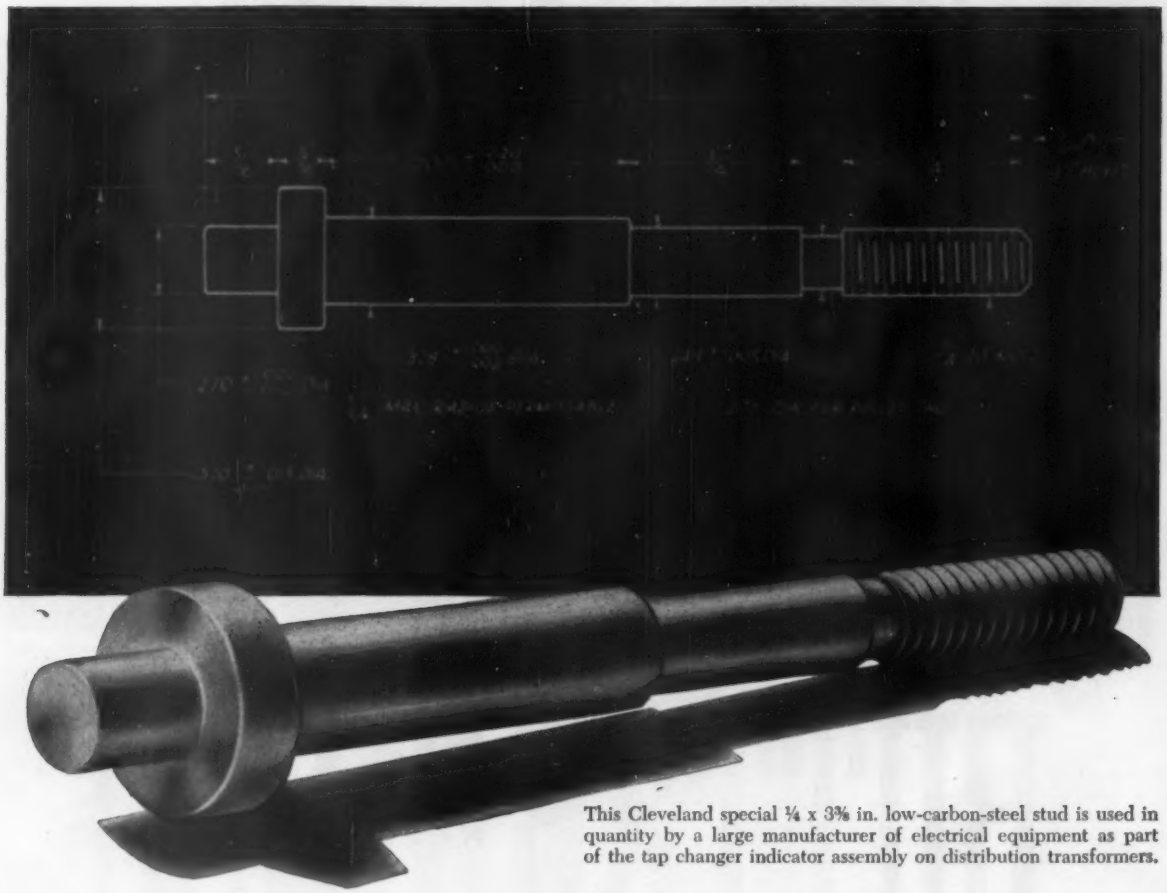
BUTTERFIELD

on drills and reamers

100% Complete Line — Every Tool 100% Inspected . . . and you get
100% SERVICE FROM YOUR BUTTERFIELD DISTRIBUTOR

Butterfield supplies taps and dies, cutters and end mills, hobs, and a full line of carbide cutting tools. There are Butterfield warehouses in Chicago, Cleveland, Detroit, Fort Worth, Los Angeles, New York, San Francisco. **BUTTERFIELD DIVISION** — Union Twist Drill Company — **Derby Line, Vermont.**

CLEVELAND SPECIAL HEADED AND THREADED PRODUCTS



This Cleveland special ¼ x 3⅜ in. low-carbon-steel stud is used in quantity by a large manufacturer of electrical equipment as part of the tap changer indicator assembly on distribution transformers.

Cost of special collar stud is cut 20% by Cleveland's cold forming techniques

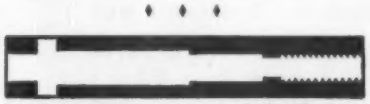
The famous Kaufman Double Extrusion Process which turns out millions of Cleveland precision cap screws yearly is highly adaptable to low-cost production of your fastener-type specials.

The tap changer stud pictured above is typical. Used by a well-known electrical equipment manufacturer, it was previously cut from bar stock. The special head, double shoulders, and groove above the threads meant numerous machining operations and considerable scrap.

Cleveland now cold forms this special stud at 20% less cost to the customer, while holding the specified .005 in. tolerance. And the part is stronger. In the head, threads and fillets, grain flow is symmetrical and unbroken. In addition, the forging action of the Kaufman process toughens surface metal while leaving the core ductile. Both fatigue resistance and tensile strength are thus increased.

We are regularly cold forming close-tolerance specials—many with unusual or extreme upsets—in large quantities. So whether your part is simple or complex, it will pay you to check with Cleveland, particularly at the design stage. There is an excellent chance that through cold forming we can cut the cost and improve the physical properties of the part you have in mind.

♦ ♦ ♦



Black area represents metal that had to be cut away when stud was produced by machining. In the Cleveland cold forming process almost all the metal in the working slug is present in the finished part. The customer saves the difference.

Write for a copy of our folder "Specials by Specialists"

THE CLEVELAND CAP SCREW COMPANY
4444-3 Lee Road, Cleveland 28, Ohio

Mighty productive this

Cincinnati HARD CLAD Radial

FLAME-HARDENED HARD CLAD® COLUMN

With its 3′ arm and 7½″ column . . . its 1¼″ capacity in cast iron . . . its 9 "right" spindle speeds and 6 power feeds . . . this new Cincinnati Radial will take on a multitude of drilling and allied jobs in your shop.

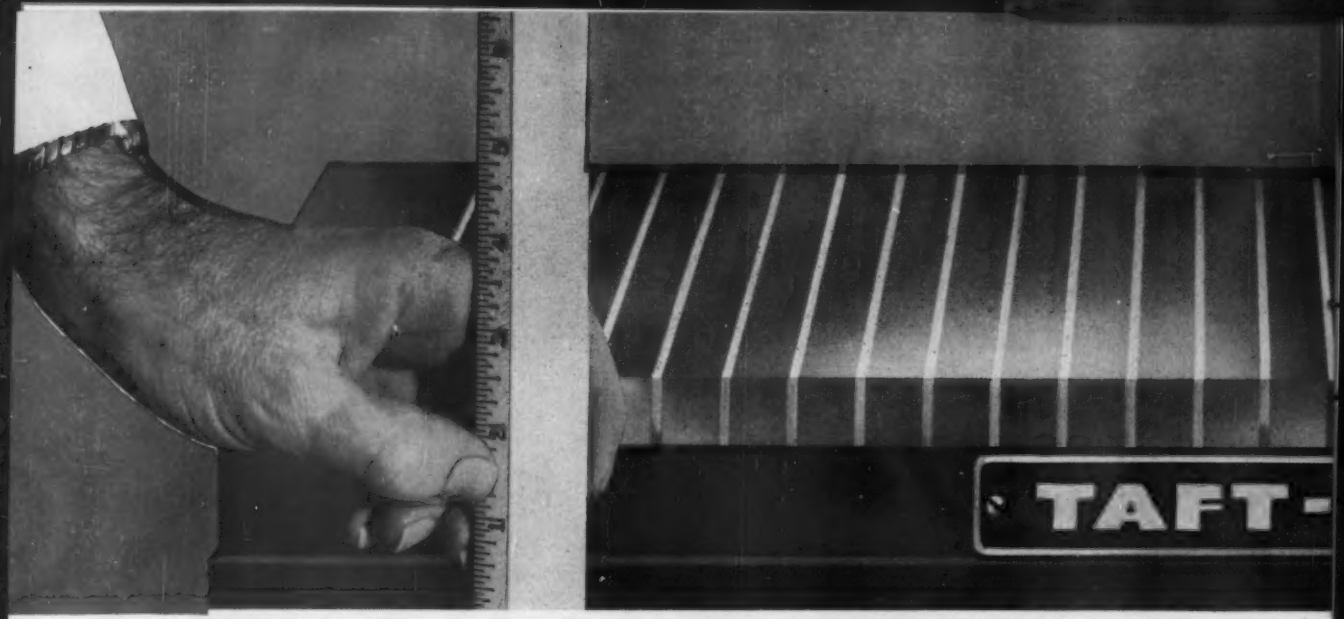
And it's *Cincinnati* engineered to give you extra years of high-productive service. The "Hard Clad" column is flame hardened to retain its built-in accuracies without scoring or pitting. Steel gears in speed and feed transmissions are hardened to provide maximum wearing qualities. All shafts are mounted on anti-friction bearings.

Cincinnati research, Cincinnati engineering are fully reflected in this advanced-design radial which combines high performance with low first cost and even lower maintenance cost. For the complete Cincinnati Radial story, see your local CL&T dealer or write direct for catalog data. Cincinnati Lathe and Tool Co., 3207 Disney St., Cincinnati 9, Ohio.

center on

cincinnati lathes and drills

Builders of Engine, Toolroom and Fixed Gap Bed Lathes and a Complete Line of Drilling Machines



❶ **LESS THAN 2½″ HIGH.** New low-boy design increases work capacity between wheel and faceplate by 1″ to 1½″ over conventional 8″ x 24″ chucks . . . a natural for handling the big jobs.

new

TAFT-PEIRCE 824*

PERMANENT MAGNET CHUCK

Low . . . Powerful . . . Precise . . . Easy to use

❷ **28% MORE HOLDING POWER...** specially engineered pack and concentration of flux gives extra holding power to handle practically all jobs, without complicated setups and with reduced costs.

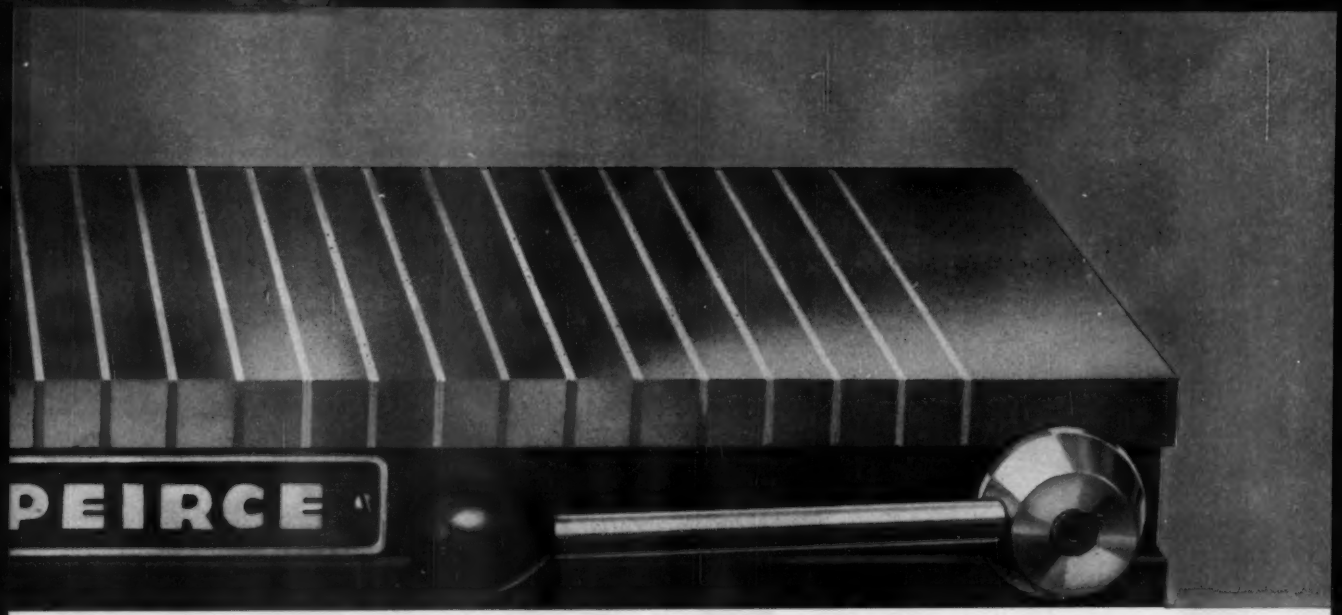
There's a lot of utility and cost saving packed into the new Taft-Peirce 824!

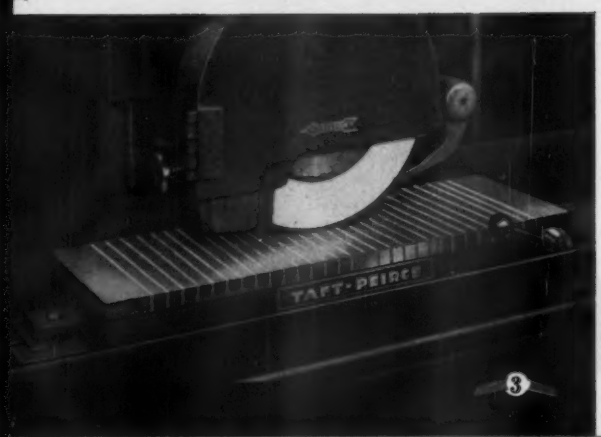
The 824 has been designed especially for *your* tooling and production requirements. Special Alnico V magnet design gives 100% all-over power, no dead spots — full edge-to-edge usable surface for ganging small parts or safely holding big ones. Holding power is better than ever — it's 28% stronger than comparable units.

Another big plus is the unique concept in faceplate design. New epoxy resin non-magnetic separators and special assembly techniques provide unusual stability and a much lighter chuck.

Check the many other shop tested features you see pictured on this page — a total of six exclusive advantages the new 824 brings to metalworking. The new 824 is ready now — through your nearest Taft-Peirce dealer or send your order to: The Taft-Peirce Manufacturing Co., Woonsocket, R. I.

*PAT. APPLIED FOR

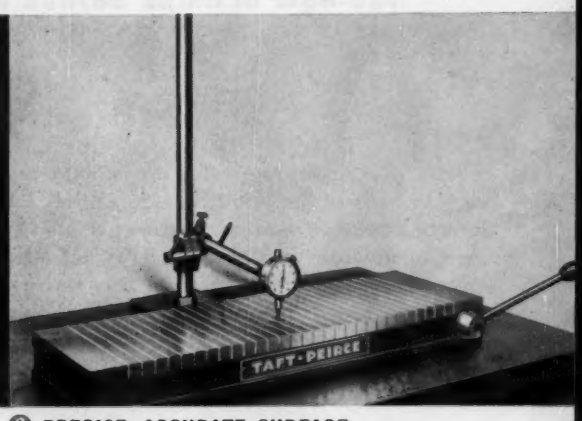




3 CHUCK DRESSES WITHOUT WHEEL LOADING... new type separators keep the wheel clean. Grinding operations are streamlined, and unproductive time is cut to the minimum.

4 NO MORE TROUBLE WITH RESIDUAL MAGNETISM... pack moves easily and quickly. With handle in "off" position, operator can get workpieces on and off the chuck in seconds.

5 27% LESS WEIGHT . . . than other chucks of the same size. Easy to handle — promotes greater utility, handy for ganging to handle big milling or grinding jobs.



6 PRECISE, ACCURATE SURFACE... faceplate uses production-proved epoxy resin separators. Surface is more stable — perfect for close tolerance work.

T-P

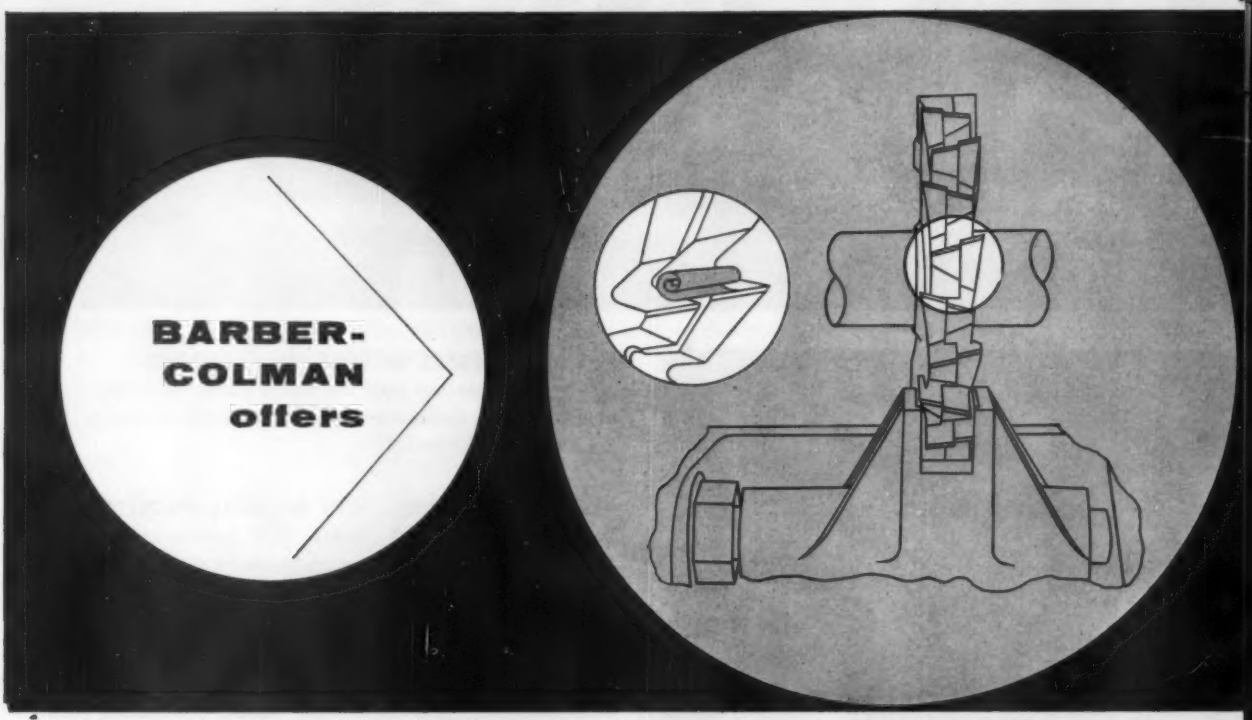
TAKE IT TO TAFT-PEIRCE

T-P Means TOP Precision

setups and with reduced costs.

*PAT. APPLIED FOR

top cutter design improves cutting efficiency and tool life



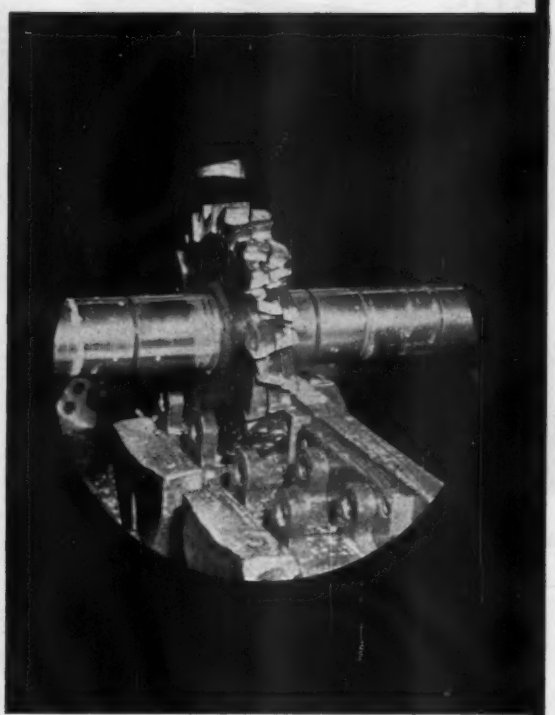
free-flow of chips across cutter face for reduced tooth breakage and increased feeds and speeds*

Improved performance and tool life are provided by these Barber-Colman interlocking staggered-tooth side milling cutters* because chips flow freely across the face of the cutter teeth. The patented interlock of the teeth provides that the entering section of the tooth in the cut is always slightly ahead of the trailing portion so that there is no chance of piling up chips or blocking chip flow. Consequently, these cutters increase tool life and permit the use of greater feeds and speeds.

Cutters of this type are recommended for long deep slotting cuts in steel, shoulder cuts and for milling operations where depth of cut exceeds the width of the cutting face. They work equally well in steel or soft non-ferrous materials. The interlocking feature provides adjustment for accuracy and longer cutter life.

The operation shown here is milling a flywheel clutch cam at Caterpillar Tractor Co. A slot 1″ long x 1⅛″ wide x 1 3/16″ deep is milled, removing .096″ stock from sides and bottom of cut.

* Patent No. 2,230,662



Compare these figures with operations in your shop:

Part.....Steel Forging, 241–285 Brinell
Cutter Speed.....54 sfm
Cutter Feed.....3.2"/min.
Pieces per Hour.....43
Pieces per Sharpening...344

increases feeds and speeds

Feeds and speeds which could stall conventional type cutters can often be used with this cutter design. The depth of cut may be as great as the depth of the cutter hub without impairing the efficiency of the cutters. Absence of chip accumulations reduces cutting temperatures to allow increased feeds and speeds.

lengthens tool life

This improved design eliminates any obstruction to the free flow of chips across the cutting face. Consequently, chip congestion found on cutters of conventional design is eliminated. Because of this chip action, cutting edges will produce many more pieces per sharpening. The absence of chip congestion also removes a major cause of tooth breakage.

guarantees accuracy

Through the interlocking feature, accurate slots can be milled throughout the life of the cutters. The width of conventional cutters becomes undersize with sharpening and they must be discarded or used for other work. The width of interlocking cutters, however, can be accurately controlled throughout the life of the cutters by using shims between the sections. Several widths of slot can be milled with the same interlocking cutter by using shims of varying thickness.

These special cutters are only one example of Barber-Colman cutter design, specifically suited to particular job requirements. When you have milling problems, consult Barber-Colman Cutter Engineers for recommendations. Send us blueprints or a trial order for your special cutter requirements. Get top cutting efficiency through top cutter design.

BARBER-COLMAN COMPANY

813 ROCK STREET • ROCKFORD, ILLINOIS

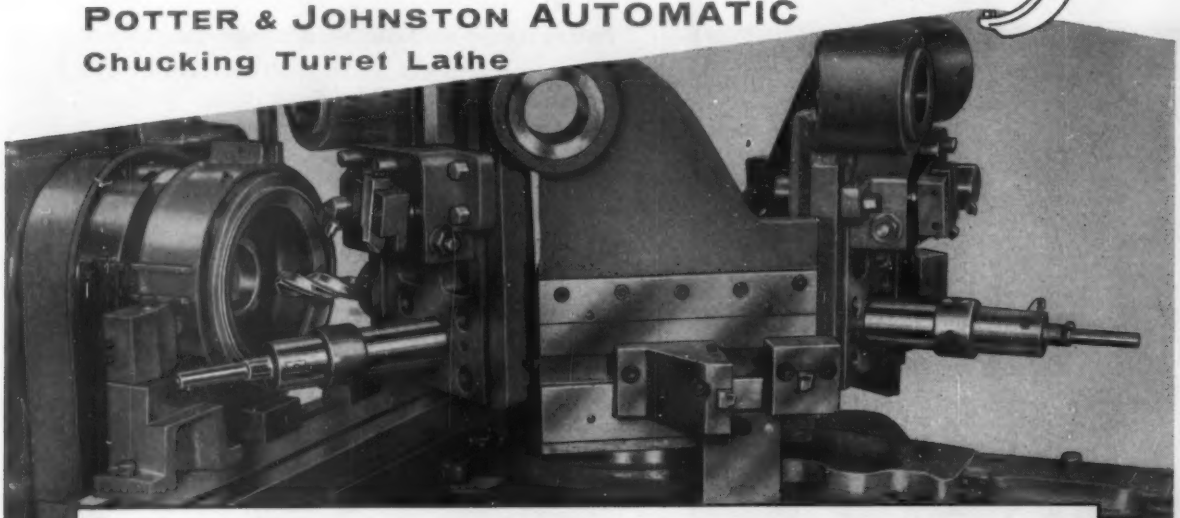
Hobs • Cutters • Reamers • Hobbing Machines • Hob Sharpening Machines

BARBER COLMAN

When the SQUEEZE is on - -
do the job on a

POTTER & JOHNSTON AUTOMATIC
Chucking Turret Lathe

+.0005″
−.0000″



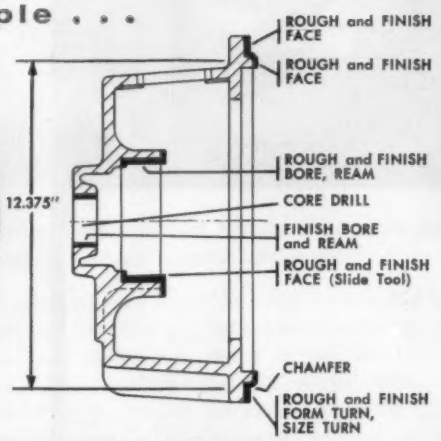
a job like this, for example . . .

BEARING BRACKET
CAST IRON

involving . . .
15 separate close-tolerance cuts including one diameter held to

HALF A THOUSANDTH !

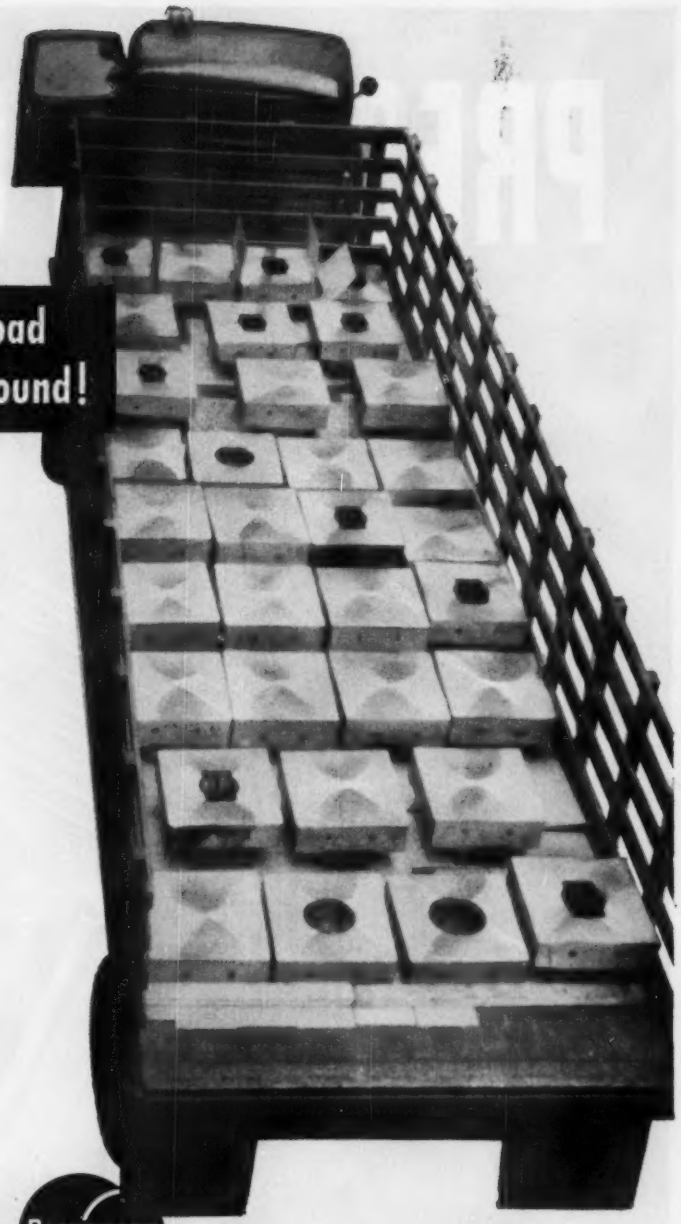
was finish machined - -
in just 4.31 minutes on a
P&J 5-DELX AUTOMATIX with P&J-ENGINEERED TOOLING



More and more jobs are calling for really close tolerances and fine finishes *plus* far faster production rates. Yes – today's higher standards mean the squeeze is on most of the time; these days you're expected to handle, as routine, jobs that were considered "specials" only a couple of years ago. There's just one way to beat the squeeze . . . profitably! Re-equip with Potter & Johnston Automatics that have the extra speed, power rigidity and versatility it takes to produce faster, more accurately and more economically. And team the machine with P&J-Engineered Tooling that takes full advantage of combined cuts and faster-biting carbide tools to reduce machining time to a minimum.

Write for literature or phone the Pratt & Whitney Office near you, and ask a Direct-Factory Representative to call and discuss your requirements. Potter & Johnston Company, Pawtucket, Rhode Island (Subsidiary of Pratt & Whitney Company, Inc.)

POTTER & JOHNSTON
Precision Production Tooling for More Than Fifty Years
AUTOMATIC CHUCKING TURRET LATHES



Precision by the Truckload - - they're Blanchard ground!

This truck is loaded with 14 tons of steel. Its cargo is 33 soft steel plates, each measuring 27½" x 25½" x 11.125", and ground to ± .001" on a Blanchard Surface Grinder.

Dies up to 84" across corners, can be ground on a Blanchard at great savings. Grinding can be controlled without guesswork—leaving a flat, sharp die—as soon as the entire surface is cleaned up. Die resharpening on the Blanchard allows you to get maximum life from your valuable dies and end plates.

Ask for details on the 15 standard Blanchard models.

For best results in surface grinding . . .

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY 64 STATE ST., CAMBRIDGE 39, MASS.

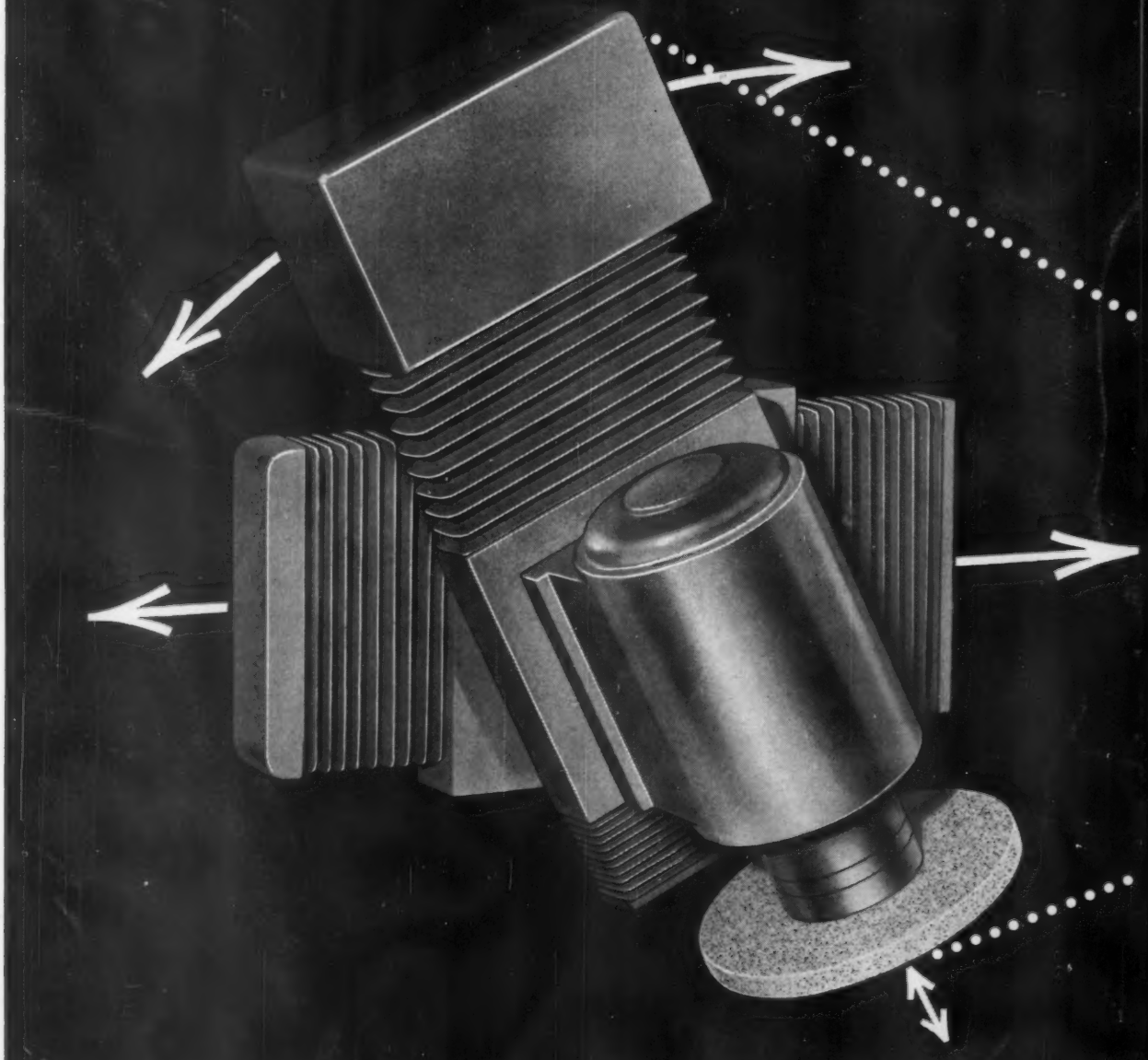
THE BLANCHARD MACHINE CO., 64 State St., Cambridge 39, Mass.

Gentlemen: Please send me a free copy of "The Art of Blanchard Surface Grinding" (3rd edition) and "Work Done on the Blanchard" (5th edition)

NAME_____ STREET_____

FIRM_____ CITY_____ ZONE____ STATE_____

PRECISION GRINDING



Diagrams show typical applications of Frauenthal Standard Slide Units to a variety of grinding problems.

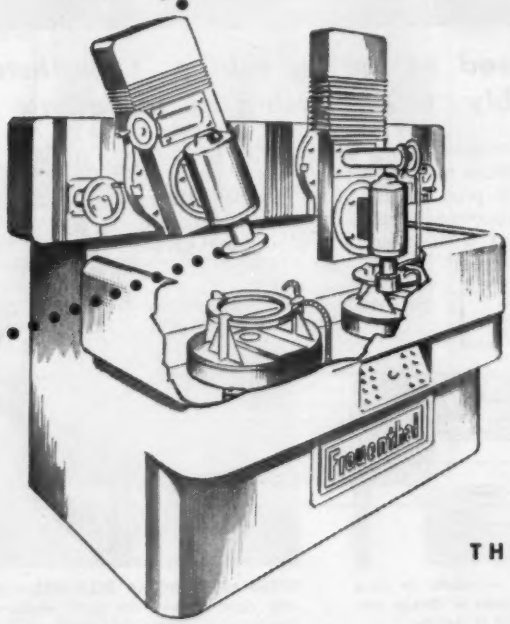
at any angle!

Frauenthal's creative engineering Now makes available Standard Slide Units in any number of combinations for production grinding applications . . .

IT IS NO LONGER NECESSARY to absorb special engineering and design costs when Frauenthal Standard Slide Units — plus a variety of grinding spindles — can be assembled to machine bases appropriate to a particular job. And these standard slides in single or multiple units can be arranged in an infinite number of spindle positions to accommodate an endless variety of simultaneous or sequenced, automatically controlled grinding operations.

What's more, you get all the advantages of Frauenthal's advanced engineering and design experience—proven on single and multiple-head grinders used on special production jobs. For example: parts for jet engines, diesel and automobile engines, tanks, gun mounts, radar units, large and small diameter precision bearings and machine tool components.

As illustrated here, this model of the versatile grinding compound shows how the Frauenthal Standard Slide Unit can be adapted to approach the work from any desired angle.

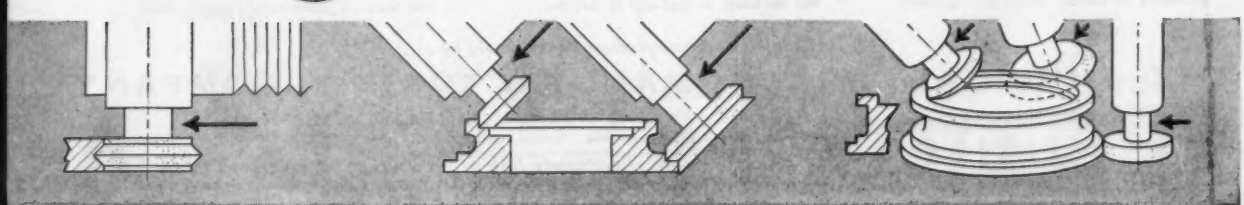


Here's a typical Frauenthal Double Head Vertical Spindle application utilizing two of the Frauenthal Standard Slide Units shown on the opposite page. Although applied to a particular grinding situation, these slide units retain versatility for angular positioning. Frequently, as indicated in panels 2 and 4 at the bottom of the page, diameters and adjacent surfaces are ground at one time with a single wheel dressed to the proper contour.

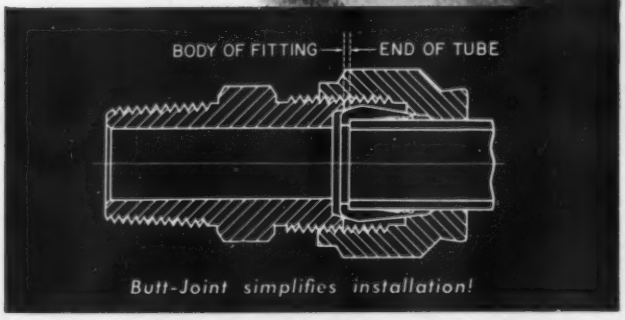
Send a print of your "problem grinding part" and our engineers will show you how to apply Frauenthal Standard Slide Units to solve the problem. Include in your letter pertinent production information — number of pieces, etc. Be sure to investigate the latest Frauenthal Vertical Grinders with Standard Slide Units. For complete details, contact Frauenthal of Muskegon.

Frauenthal Division
THE KAYDON ENGINEERING CORP.
MUSKEGON, MICHIGAN, U. S. A.

F-256



the most important advance in tube fittings in 20 years!



New IMPERIAL HI-SEAL

Furnished in steel and stainless steel

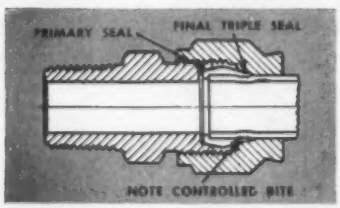
makes a positive butt-joint • no need to spring tubing • withstands higher pressures • foolproof assembly • no flaring or threading

Hi-Seal is the successor to all present tube fittings for high-pressure, severe service. Never before such ease in making a truly foolproof tubing connection. Sleeve fits only *one* way, cannot be installed in reverse — no chance for error. Positive butt-joint with no tube entry into body of fitting eliminates need to spring tubing. This is especially important when working with large-diameter, heavy-wall or hard-temper tubing. Positively no torquing of tube when making a joint!

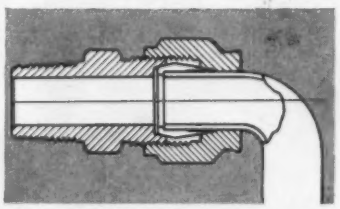
All this plus the fact that Hi-Seal fittings can be disconnected and reconnected as often as desired with assurance of original pressure-tight seal!

Conforms to **J.I.C.** Standards

Ask your Imperial distributor for full details on the Hi-Seal Fitting. Write for Bulletin 3061.



FOOLPROOF ASSEMBLY—Hi-Seal goes together only one way. No need to disassemble or double check for tightness.



CLOSER TUBE BENDS — works in close quarters where other types of fittings cannot be used. A real aid to design.

WITHSTANDS HIGHER PRESSURES—Joints stay tight beyond the burst pressure of the tube . . thoroughly field tested.

Created and manufactured exclusively by . . .

THE IMPERIAL BRASS MANUFACTURING COMPANY

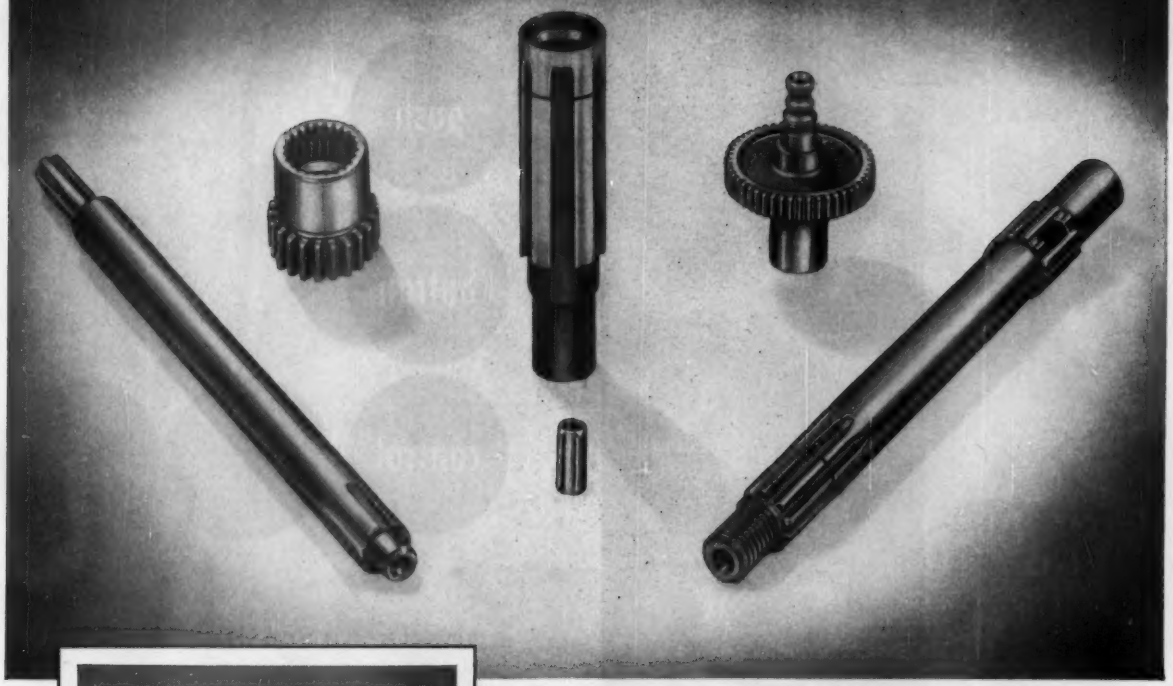
570 S. RACINE AVENUE, CHICAGO 7, ILLINOIS

In Canada: 334 Lauder Ave., Toronto, Ontario

IMPERIAL

Industry's most complete line of tube fittings and tubing tools.

Simple Or Intricate Splines and Serrations Are Jobs For G.S. ENGINEERING



GEAR
Specialties, Inc.
2635 WEST MEDILL AVENUE
CHICAGO 47, ILLINOIS

SPURS • SPIRALS • HELICALS • BEVELS • INTERNALS
WORM GEARING • RACKS • THREAD GRINDING

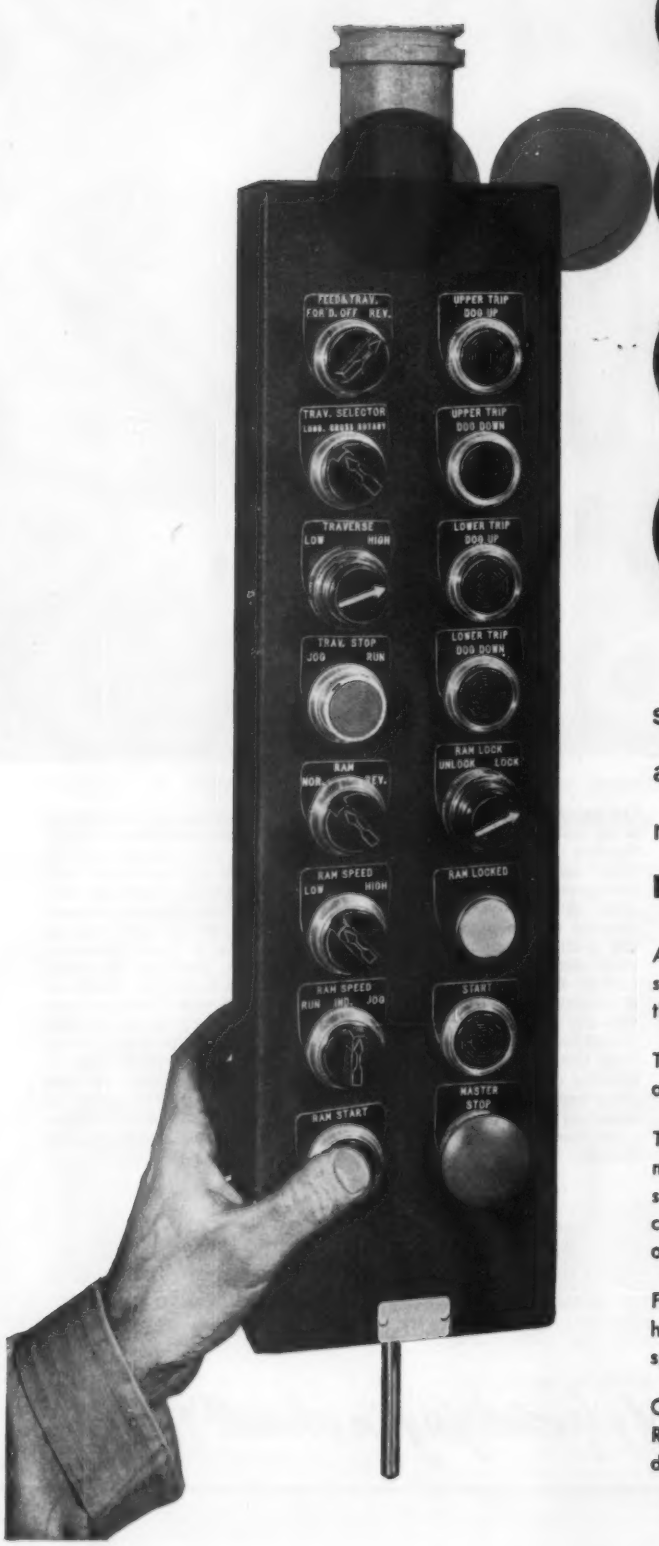
WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARING

The extreme uniform accuracy of splines and serrations in G.S. Gearing is the result of 41 years of specializing in the mass-production of Small Gearing exclusively! Critical customers from coast-to-coast specify "G.S." again and again for the engineering skill and production efficiency only these long years of highly specialized experience can give. ★ The group of components shown above feature internal, external and involute splines and serrations. "Parallel Side" splines are multiple keys. They can be made to either a major diameter, minor diameter, or side fit with mating part. G.S. generates the externals by the hobbing or shaping process . . the internals by broaching or shaping. Involute splines are multiple integral keys having a pressure angle of 30°. They offer the advantage of greater strength. Involute serrations are essentially involute splines with 45° pressure angle. They are made for side fit applications only. ★ Whatever *type* of Splining or Gearing YOU require, however simple or intricate, you can place implicit confidence in G.S. to *consistently* supply TOP quality at moderate cost. Send drawings or descriptions today! Let our skilled engineers suggest the ONE best and most economical application for the job. There's no cost or obligation.

SEND FOR FREE *6-page Small Gearing Guide. It describes 80 types and applications. Contains useful charts . . a valuable aid to anyone interested in Small Gearing. Use company letterhead, please. No obligation, of course. Write today!*

FRACTIONAL HORSEPOWER GEARING

41 Years of Specializing in Small Gearing!



push button control

speeds operation and set-up on new Rockford **hydraulic** slotter

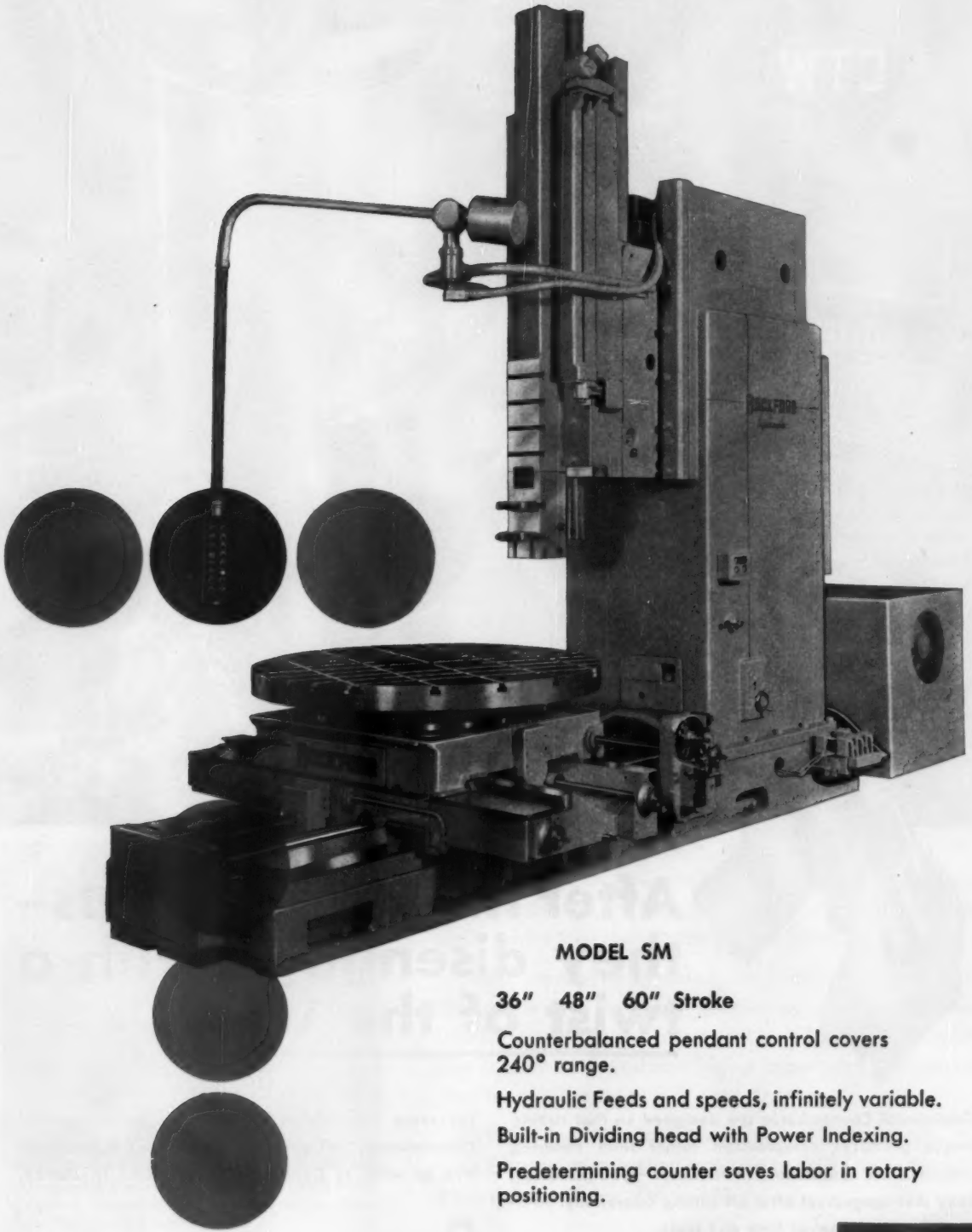
All longitudinal, transverse and rotary movements are selected and operated from the push button station of this new Rockford hydraulic Slotter.

The ram lock is pendant operated and ram stroke length and position are completely push button controlled.

Two-speed table traverse is available, enabling the machine operator to position the work to a few thousandths, without manual movements, although manual control of all movements is available from either side of the machine.

Full hydraulic drive provides two cutting ranges, one for high speeds and low cutting forces; the other for slow speeds and heavy cuts.

Get full details on this new hydraulic slotter from any Rockford Machine Tool Co. representative, or write directly to us.



MODEL SM

36" 48" 60" Stroke

Counterbalanced pendant control covers 240° range.

Hydraulic Feeds and speeds, infinitely variable.

Built-in Dividing head with Power Indexing.

Predetermining counter saves labor in rotary positioning.

ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

HYDRAULIC

CTW

Continental Counterbores may be purchased individually or in sets. Selection of three sets available.

After the heaviest cuts—they disengage with a twist of the wrist

Continental Counterbores are designed so that cutting torque produces compression rather than shearing stresses. This counterbore never binds—you get quick, easy disengagement after all cutting operations. Anti-wedging action saves time and tools.

Continental Counterbores have double driving lugs on the cutters which engage double abutments in the holders, making a single powerful tool out of the cutter and holder. Double bearings, one above and one below the lugs and close to the cutting edge, guarantee rigid alignment of holder and cutter.

For more information or literature on Continental Counterbores, call your local Ex-Cell-O Representative or write to Continental Tool Works in Detroit.

Continental TOOL WORKS

DIVISION OF

EX-CELL-O CORPORATION • DETROIT 32, MICHIGAN

56-61

"WE'D BETTER GET TRANSPARENT SUNICUT FOR THESE JOBS WHERE WE HAVE TO SEE THE WORKPIECE. JOE JUST CAUGHT HIS NOSE IN THE THREADING MACHINE."
LOCKE

For precision cutting...

TRANSPARENT SUNICUT OILS ASSURE YOU GOOD VISIBILITY, PEAK PRODUCTION

Transparent Sunicut oils assure excellent finish in critical operations at close tolerances. Good visibility speeds production.

Transparent Sunicut® oils, including heavy-duty and dual-purpose oils, are available in many grades to suit your specific needs. They give outstanding results...especially where precision cutting is required.

Their transparency takes the "blinders" from work that needs close watching, permitting close product control, faster production, lower unit cost. Machine operators like Sunicut's "cleanliness." Most important, *transparent Sunicut oils assure you of good finishes.*

For full information about Sunicut cutting oils, call your Sun representative, or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. **AM-3.**

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

Philadelphia 3, Pa.

In Canada: Sun Oil Company Limited, Toronto and Montreal

SUNOCO®

©Sun Oil Company

HARDINGE
ELMIRA, N.Y.

Variable Speed Machine
for
PRODUCTION DEPARTMENTS

Produce More Precision Parts at Lower Cost with this NEW Second Operation Machine

Send for Free illustrated Bulletin DSM59

OFFICES IN PRINCIPAL CITIES. Export Office: 269 Lafayette Street, New York, N.Y.

HARDINGE BROTHERS, INC., ELMIRA, N. Y. U.S.A.

Why Grandmother!

Stories on grinding wheel problems—just like the kind you tell the youngsters—can have a happy ending. And we're writing new ones day after day for plants where high grinding wheel costs and low production have been wolfing up profits.

If *you* are ready to "cry wolf," let us send CINCINNATI (PD)° WHEELS to the rescue. For *now* CINCINNATI Grinding Wheels offer POSITIVE DUPLICATION—a remarkable achievement in precision manufacturing and quality control that can *save you money—and increase your production.*

Through the CINCINNATI (PD) Manufacturing Process you are assured Positive Duplication of the original wheel *every* time you reorder. "On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

Yet CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

So, if grinding problems have you ready to shout for help, just contact your CINCINNATI Grinding Wheel distributor. Or, contact us direct and we'll send one of our representatives —men who know grinding and grinding machines as well as grinding wheels. Write, wire or telephone—Sales Manager, Cincinnati Milling Products Division, Cincinnati 9, Ohio.

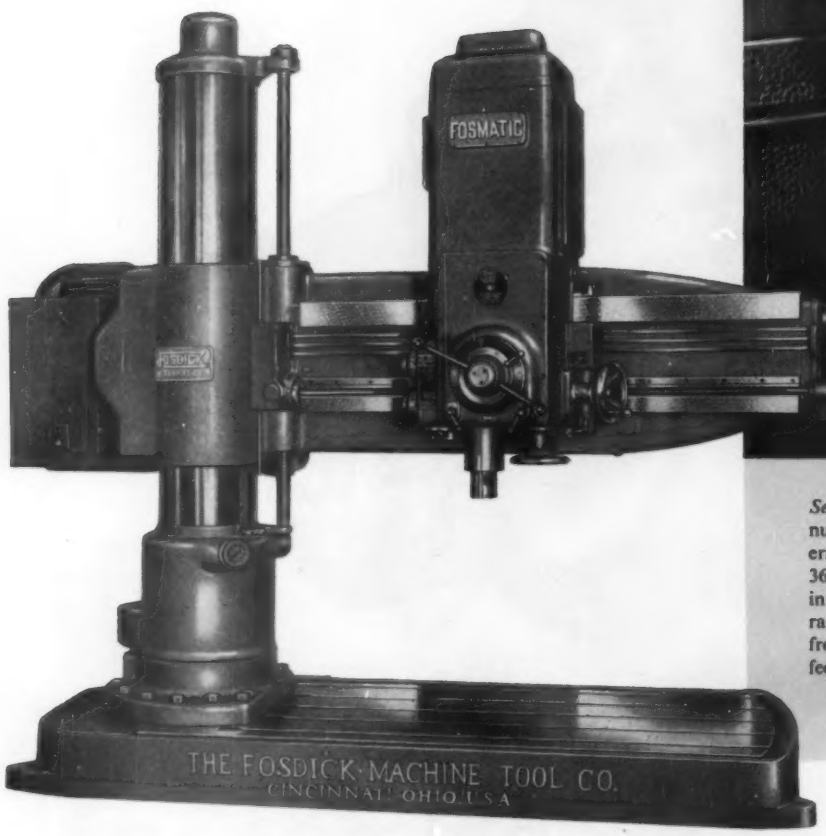
Remember—*only* CINCINNATI Grinding Wheels give you . . .

(PD) POSITIVE DUPLICATION

CINCINNATI° *Grinding Wheels*

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

°Trade Mark Reg. U. S. Pat. Off.



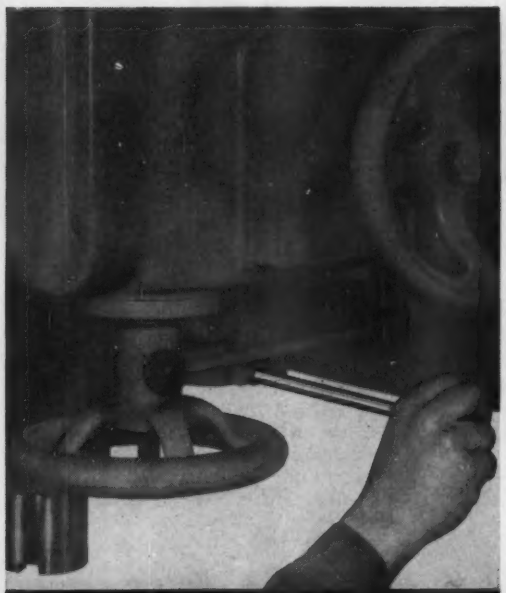
DIALS

Select feeds and speeds with easy-to-read numerical dials. Minimum possibility of error. To save time, select while drilling. 36 spindle speeds, maximum 3000 rpm, in variety of ranges, each with 127.5 to 1 ratio. 18 feeds, including 6 tap leads, from .003″ to .125″. Electronic milling feeds are also offered—from ¾ to 15 ipm.

FOSMATIC RADIAL

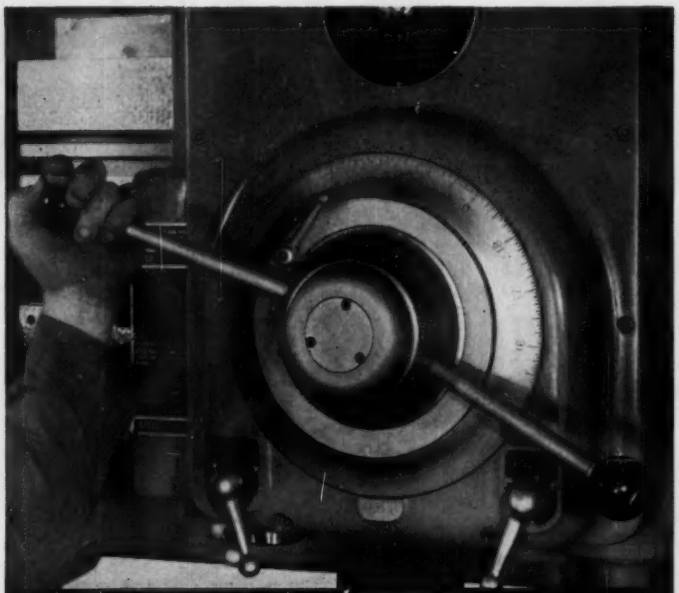
SIMPLE CONTROLS

FAST, EASY PRECISION DRILLING



LEVER

Shift, start, stop and reverse with single lever. Shifting to new feeds and speeds is accomplished by raising lever slightly in its neutral position. For faster tapping, reverse spindle speed is up to 40% faster than forward speed.



PUSH BUTTONS

Engage feed by pressing button on either quick-return handle. Feed is disengaged by depth control or by pressing either button again. Feed dial is graduated to full spindle travel, to eliminate resetting for deep holes. Powerful magnetic clutch which engages feed will never need adjusting. Head and column can be clamped automatically when feed is engaged, if desired. They are unclamped by independent levers.

Fast, rigid, precise, easy to run—that's what today's machine shop demands in a radial. And that's what makes the Fosmatic outstanding among radial drills. The simple controls shown here save valuable seconds of operator's time, with each hole drilled. Other convenient controls at the head—single lever to raise and lower arm (hydraulic clamp interlocked) and traverse head; hydraulic column clamp; hand feed and traverse to head; tool ejector eliminates need for tang driver.

The new boring-type spindle is of heavy section with bearings placed far apart for extreme rigidity; it can be used for boring, milling and the heaviest drilling. A new and unique counterbalance produces equal tension on the spindle whether it is extended or close to the head. Case-hardened gears are ground on the finest equipment available. They run on ground splined shafts which are mounted in ball bearings. Lubrication is automatic.

Our new arm is the strongest in the business. It has a double box section with very heavy walls; ways have been widened considerably. The head is mounted on roller bearings on hardened and ground ways with an additional roller support in back of the arm. Safety nut is hydraulic. Column is superfinished.

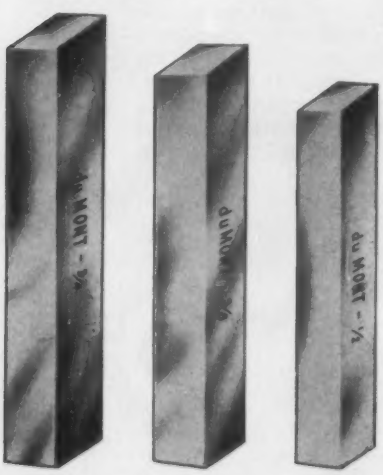
Standard sizes available with 4' to 8' arms, 13" to 19" columns. Write for Catalog RD-A.

BALANCE
makes
du MONT TOOL BITS
BETTER 2 WAYS

The extra fine grain structure of du Mont Tool Bits is *precisely balanced* in *toughness, wear resistance* and *red hardness.* As a result du Mont Tool Bits

1 Take a keener cutting edge

2 Take more cuts per bit



Clip and mail the coupon to get full information on these *balanced* tool bits, ground square and rectangular.

MAIL TODAY—SAVE TOMORROW

The duMONT CORPORATION
Greenfield, Massachusetts

MAIL FREE Tool Bit COMPARISON CHART, CATALOG and PRICE LIST A to

Name.....

Company.....

Address.....

Letters...

To American Machinist
330 W 42nd St, N Y 36, N Y

Who Makes Toolmakers?

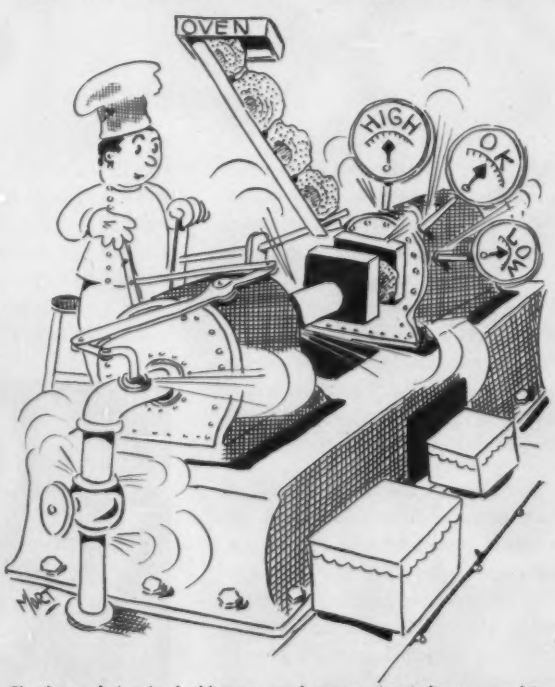
I am in my second year as a vocational machine shop instructor, and after twelve years in industry, I am genuinely concerned with the growing shortage of toolmakers. As I see it, a large part of the problem can be traced to the high school personnel who are responsible for guiding the boys into studies that lead to their future careers.

These guidance people are teachers, and that is all they know. By and large, they have never worked with their hands, and what little knowledge they have of the skilled trades is flavored with a rather down-the-nose attitude. It does not take much imagination to picture this attitude; a shop man has run into it before. Needless to say, these people do not help us at all. They should be better informed—by someone they will listen to.

I would like to suggest that the metalworking industry devote some thought and effort to publicizing the skilled trades to the high school student and to the guidance personnel. If enough large concerns would bombard the high schools with the growing urgency of our needs in this field, a change of attitude might be effected.

The youth of today are going to be difficult to reach, perhaps, but I believe that industry has the brainpower to accomplish something in this direction. After all, for those capable boys whose education will terminate with high school, the skilled trades offer more than most other choices open to them, and they deserve to know it. I would like to see, for example, an up-to-date statistical treat-

MACHINES OF TOMORROW



The latest design in double compound compressing indicators used in the metropolitan area to determine the air pressure in French breakfast pastry. (To be introduced by Appurtenance Machine Co.)

SHOW THIS TO YOUR TOOLMAKER

Ask him if he doesn't agree that the Leland-Gifford No. 2LMS Toolroom Drill Press provides every feature and convenience needed in the modern toolroom for fast, accurate, effortless drilling and tapping. Developed in cooperation with leading tool engineers, this machine has won wide acceptance as the ideal drill press for general purpose toolroom use. Write for complete information.

LELAND-GIFFORD

No. 2LMS

TOOLROOM DRILL PRESS

with all these features:

1 Illuminated indicating shift with cutting speed chart.

2 Conveniently located hand wheel for changing spindle speeds and shifting back gears without stopping machine.

3 Positive stop for accurate depth adjustment.

4 Capacity of No. 2 Morse taper. No. 3 MT optional.

5 Extra large 37″ x 25″ or standard 26″ x 25″ work table.

6 26″ swing with 13″ overhang.

7 Handy push-back table raising crank and quick-acting table lock.

8 Foot switch start-stop motor control leaves operator's hand free.

9 Counterbalanced sliding head for effortless vertical adjustment.

10 Built-in light for table and work surface illumination.

11 Reversing motor control for tapping — provides manual control from feed lever or automatic control by depth stop.

12 Sensitive hand lever feed with ratchet adjustment.

LELAND-GIFFORD

Drilling Machines

WORCESTER 1, MASSACHUSETTS, U. S. A.

CHICAGO 45
2515 West Peterson Ave.

DETROIT
10429 West McNichols Rd.

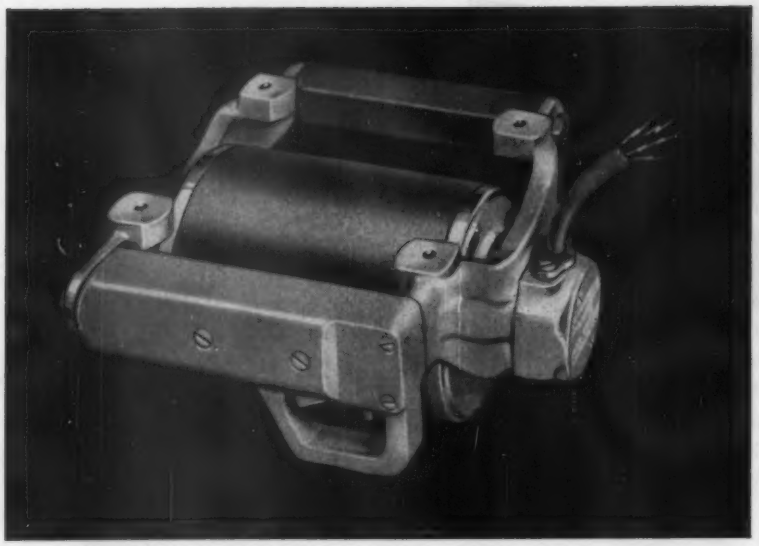
CLEVELAND 22
P.O. Box 853

NEW YORK OFFICE
75 South Orange Ave.
South Orange, N. J.

LOS ANGELES OFFICE
2620 Leonis Blvd.
Vernon 58, Cal.

INDIANAPOLIS 6, P. O. Box 1051

ROCHESTER 12, P. O. Box 24, Charlotte Station



DEMAGNETIZATION

Made by the Originators of the Magnetic Chucks

WALKER makes a complete line of Demagnetizers, including the portable shown here. This demagnetizer is particularly well adapted for removing residual magnetism by rolling the unit slowly along the work. Other types are available, including hollow core demagnetizers.

WALKER Demagnetizers are compensated so that the magnetic flux increases as iron comes into the demagnetizing field. They can be arranged for production line by passing endless belt through aperture to carry work pieces.

O. S. WALKER CO. Inc.
WORCESTER 6, MASSACHUSETTS
Original Designers and Builders of Magnetic Chucks

IN CANADA—UPTON BRADEEN & JAMES, LTD.

ment in graphic or tabular form, of the annual earnings of journeyman toolmakers (including their overtime, since this has become a basic part of their wage structure) as compared to the annual earnings of lawyers, engineers, professors, etc. I believe that today's toolmakers will rank surprisingly high, and this information could be forwarded to high school guidance counselors in a suitable format for posting on a bulletin board. The publicity departments of industry can undoubtedly think of many more ideas, once they begin to work on the problem.

Name Withheld

We agree that local industry could perform a valuable public service by seeing that proper vocational guidance is given and that toolmaking is given its fair chance to interest capable students who do not go beyond high school. —Ed.

We Apologize

Your report of operations at Boeing Airplane Co, Seattle, Wash, in which CO_2 was featured as process media in routing and other operations, was spectacularly and ably set forth. (*AM*—Jan 14 '57, p107).

However, one important segment of information was not included in the article. This con-

Helpful Henery

"Here, let me turn the light on! You fellows can't see sitting there in the dark!"

cerns the fact that Boeing Airplane Co, is a licensee of the writer under US Patent No. 2,670,528 (March 2, 1954), and the art, as employed in their plants, is within the scope of the same.

This important disclosure will, I am sure, be appropriate to add to a forthcoming issue of AMERICAN MACHINIST in order to prevent an incident due to the misapprehension on the part of someone that the art, as disclosed in the patent, is in the public domain.

Paul E. Brunberg
Detroit, Mich

Scrap=Chips

Give a look at the Kaiser ad on pages 72-73 (*AM*—Dec 17 '56). Do tell us readers how the scrap saving percentages were figured out, especially at such variance. How could such obviously simple jobs be run with such a high rate of scrap? This does not say much for the average American machine shop.

This note is not intended as a criticism of your excellent periodical. I look forward to every issue and devour it cover to cover, including your advertising pages—but such a high rate of scrap is beyond all proportion.

May I have your comments on this?

Charles J. Church
Hastings, Mich

We're just the middleman. Here are Kaiser's comments—Ed.

This is scrap that is generated when machining the part. Perhaps in the future we could show this percentage as "scrap accumulated." I am surprised anyone would be in doubt, as the amount of *parts* scrapped for these particular jobs was probably much less than 1%.

The savings we have listed in our ad are for material only, with the machine time being the same for aluminum as for brass.

Dudley T. Ross
Kaiser Aluminum & Chemical Corp
Oakland, Calif

The word "scrap" is a general term and can be used for either rejected parts or for chips, turnings, and trimmings. As used in this ad, it means the amount of metal removed from the bar—Ed.

ACCO products

Wilson "Tukon" Micro Hardness Testers

UNEXCELLED *for testing fine parts...* **METALLIC and NON-METALLIC**

WILSON "TUKON" Micro Hardness Testers meet every fine test requirement. These precision instruments are invaluable in the proper testing of fine precision parts, fine wire, thin metal, shallow superficially hardened surfaces, jewels, plastics, glass, etc. WILSON "TUKON" testers operate with both Knoop and 136 degree Diamond Pyramid Indenters.

Consult with WILSON Engineers on your hardness testing problem

Experienced WILSON Engineers will be glad to help you select the proper model for your particular requirement. This choice depends on the type and thickness of work to be tested, range of loads and other hardness testing equipment available.

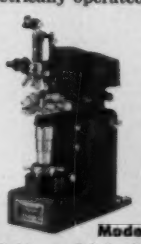
Write for Booklet **DH-328** *on WILSON "TUKON" Micro Hardness Testers. Ask for* **DH-325** *on WILSON "ROCKWELL" Hardness Testers.*

WILSON "ROCKWELL"...

the world's standard of hardness accuracy

Model LR
Floor model for Micro and Macro Hardness Testing.

Model FR
Floor model for Micro Hardness Testing only. (Electrically operated)



Model MO
Table model for Micro Hardness Testing only. (Mechanically operated. Also available in floor model)

ACCO

Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE

230-B Park Avenue, New York 17, N. Y.

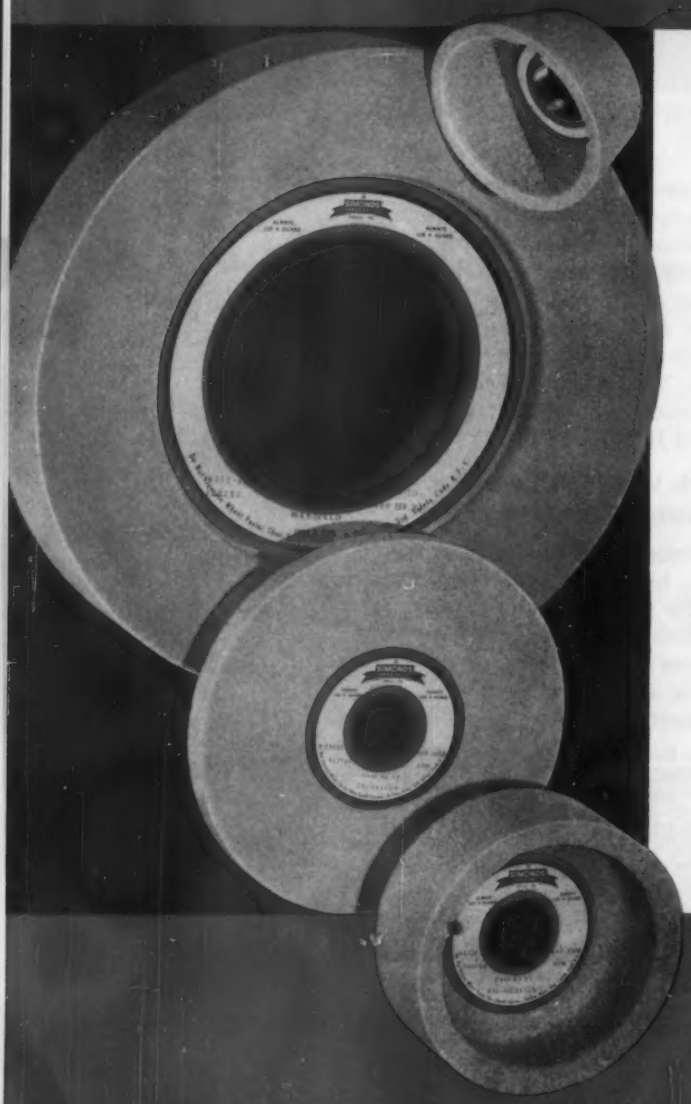
for Better Value

Radically different

SIMONDS SA *Borolon*®

TRADE MARK

Grinding Wheels for toolroom use . . .



SA Borolon is a single crystal aluminum oxide abrasive possessing superior qualities over conventional white aluminum oxide abrasive. It is produced from a furnace charge consisting of a molten base with a soluble matrix which dissolves, leaving single natural crystals of abrasive grain *without crushing.*

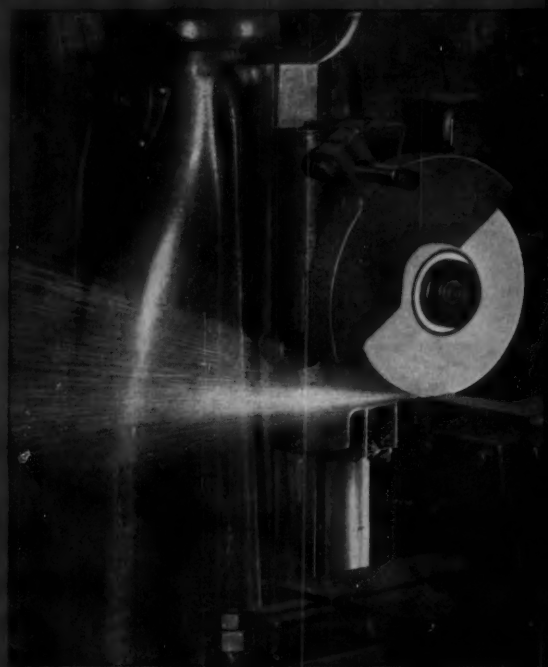
Being single, natural crystals, each abrasive particle of SA Borolon is free of the inner stresses and strains to which multi-crystal, crushed abrasive is subjected under grinding pressures. Also, each abrasive particle contains more cutting edges, which permits greater penetration into the work and faster grinding. SA Borolon has the greatest surface hardness yet achieved with aluminum oxide type abrasives. Write for illustrated Catalog Bulletin ESA-272.

POPULAR SIZES AVAILABLE FROM STOCK FROM YOUR INDUSTRIAL DISTRIBUTOR . . .

New and better

for tool and cutter grinding

SA Borolon®
TRADE MARK

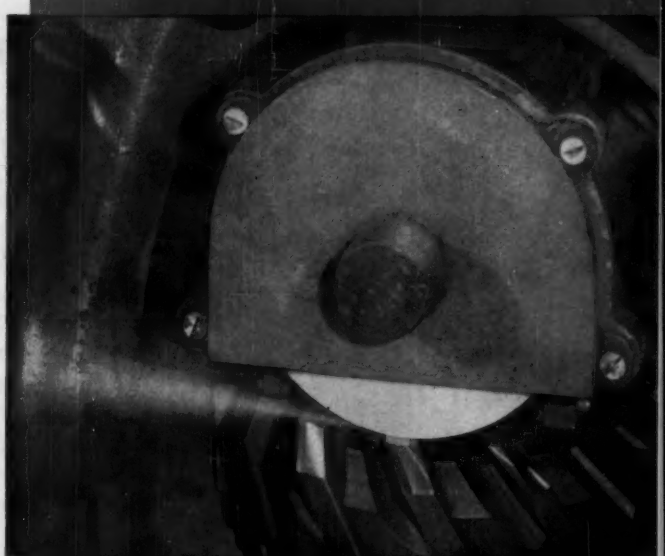


COOLER GRINDING

Because of its tough, hard crystal structure, SA Borolon bites into the work, and fractures before point dulling can set up frictional drag, with consequent risk of damage to steel temper.

FASTER CUTTING

Because SA Borolon is made up of a single, unbroken crystal with multiple cutting faces, over its entire surface it provides a regular sequence of sharp edges on the wheel face. This differs radically from ordinary blocky grain in which blunt faces are interspersed with cutting edges.



LONGER LIFE

Because SA Borolon has (1) increased resistance to dulling and (2) fractures so as to increase the "self-sharpening" feature of the wheel, less dressing is required and wheel life is prolonged.

BETTER FINISH

The sharp, free, cool-cutting action inherent in the single crystal structure of SA Borolon, means improved finish on *your* toolroom grinding jobs.

SIMONDS ABRASIVE CO.

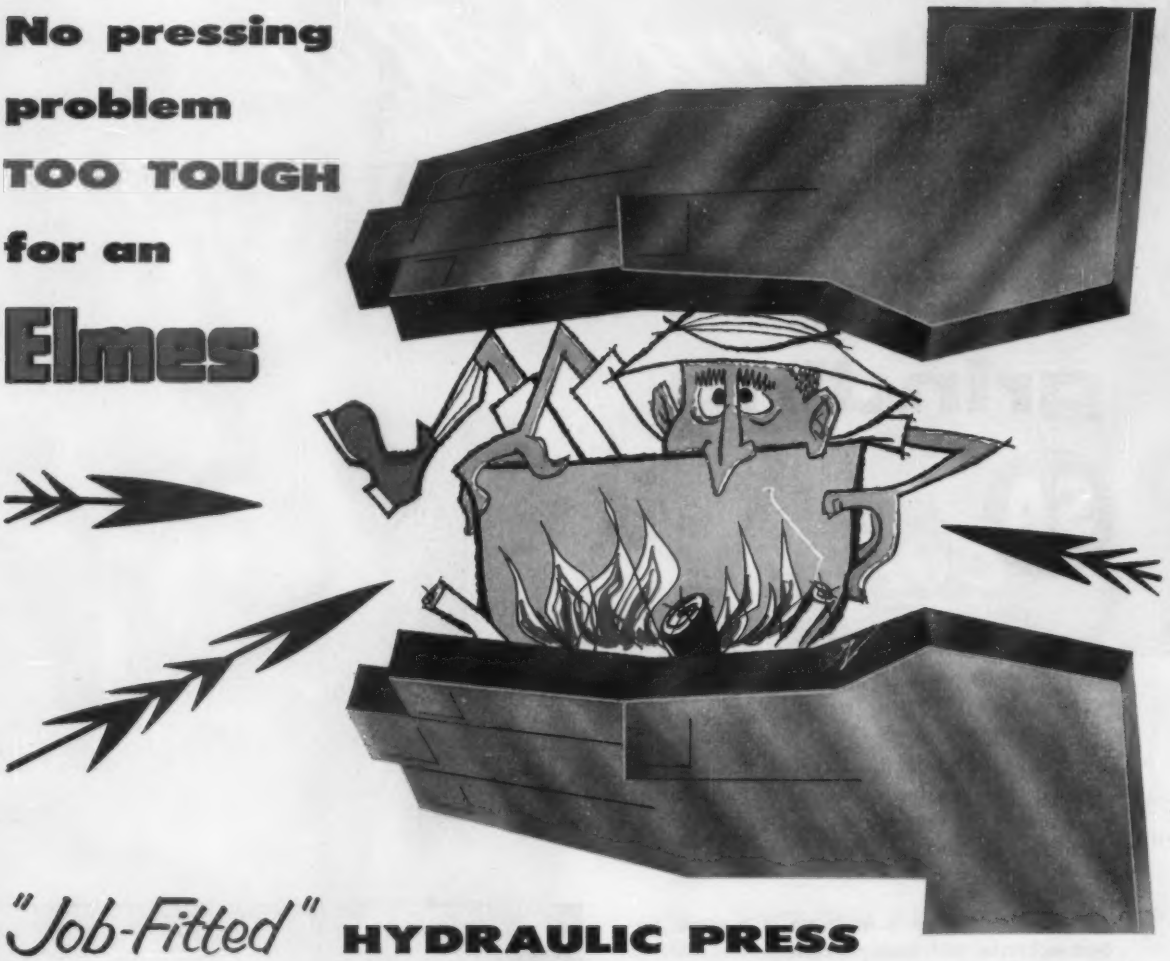
SIMONDS ABRASIVE COMPANY

Tacony & Fraley Sts., Philadelphia 37, Pa.

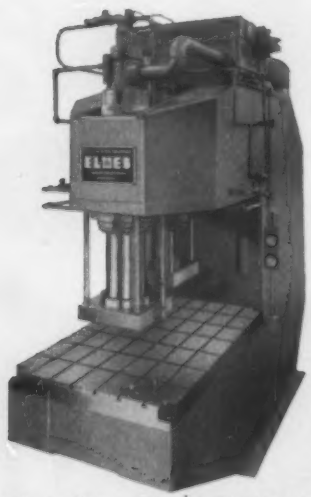
DIVISION OF SIMONDS SAW AND STEEL CO.

BRANCHES: PHILADELPHIA, CHICAGO, DETROIT, LOS ANGELES, SAN FRANCISCO, PORTLAND, ORE.

No pressing problem TOO TOUGH for an Elmes



"Job-Fitted" HYDRAULIC PRESS



Elmes 600-ton C-Frame Forming and Straightening Press. This press has two 300-ton cylinder assemblies. Either assembly can be operated individually, or both can be operated in unison for a total capacity of 600 tons. An excellent example of the adaptation of a standard Elmes design to meet special requirements.

"Missionary work" needn't get you in a stew. When development planning presents really tough problems in pressure application—*that's* the time to call Elmes "to the rescue," for consultation and recommendations. More than 60 years of specialized hydraulic press experience makes Elmes preeminently equipped to provide *the right press for the job.*

It may be that a standard-design Elmes® Press—for drawing and forming, bending, forcing, straightening, hobbing, etc.—will meet all your requirements. Or a simple adaptation may be indicated. Or unusual production requirements may call for development of a special "custom built" press—a large and important part of Elmes service to industry.

In any event, whatever your particular needs, Elmes experience and ingenuity are your best bet for turning pressing problems into profit-making performance. Distributors in principal industrial centers.

Elmes American Steel Foundries
ENGINEERING DIVISION

1161 Tennessee Avenue, Cincinnati 29, Ohio

METAL-WORKING PRESSES • PLASTICS MOLDING PRESSES • PUMPS • ACCUMULATORS

Spot news...

- **Air Materiel Command is testing a number of Russian machine tools.** Entire machines and components are undergoing thorough tests by Air Materiel Command and a US machine tool builder to see just how good they actually are.
- **New alloy that holds up under 75,000 psi stress at 1200 F for 300 hours** has been developed by Westinghouse. Made up of six elements (Fe, Ni, Cr, Mo, Ti and B), alloy "W545" is being turned out in 3500-lb ingots on a pilot plant scale. It's expected to increase jet plane operating temperature by 100 F.
- **U S auto parts makers are flocking to Brazil** in the wake of announcements by Ford and GM that they will build major truck plants near Sao Paulo. Reason: Brazilian law stipulates that bulk of parts for any vehicle made in Brazil must be manufactured in that country. To get around the law, parts makers are building plants there instead of shipping in parts. And it's said that if a stamper will set up a major plant there, Ford and/or GM will (1) furnish the dies, (2) produce passenger cars there, too.
- **Phone system whereby you dial an extension directly from your own phone** on an outside call to Boeing's Renton, Wash, plant is said to be the first such setup in U S industry. It's called "direct inward dialing."
- **First "auction on credit" of used machine tools** was held March 5-6-7 in New York and Hoboken, N J. Some $6.5 million in machinery went under the hammer for (1) cash, (2) time payments, or (3) on a rental basis.
- **Ford will turn its Highland Park plant over** to manufacture of metal and plastics small parts, now purchased from suppliers. Ford is spending $6.7 million to change the plant over from truck production.
- **While manufacturing firm mergers are decreasing,** mining and manufacturing companies still accounted for an impressive 71% of all important U S mergers in 1956 (non-electrical machinery makers led the pack with 100). And although industry as a whole showed a drop from 1955 merger levels, electrical machinery makers had 70 mergers in 1956, opposed to 53 in 1955.
- **Government is trying to work out a better way to estimate productivity.** Under the present hazy system, it will take three years before 1956 productivity rate can be figured out. A committee is at work trying to find a faster way of telling whether wages are outstripping productivity.
- **NLRB decision may cause welders to break off from IAM** and join the independent United Welders of America. In a case involving 12 welders at Hughes Aircraft, the Board reversed previous decisions, ruling that welding is a craft, and welders can establish separate bargaining units.
- **Stainless steel hemisphere surfaces accurate to 4-6 mu in.** are being produced at Bausch & Lomb, Rochester, N Y, by a process that superfinishes hard-metals in spherical, parabolic and elliptical shapes to 36 in. dia.
- **Uranium will be melted, forged, rolled, slit, clad, machined** and vacuum-annealed at a new 53,000-sq-ft plant to be built and operated by D E Makepeace Co at Plainfield, Mass, under AEC auspices.

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Lowers Cost of Gear Cases– Speeds Production!

Ex-Cell-O 2-Way Machine

ABOVE: Gear case after machining. Hole sizes are held within .0005", centers .001".

BELOW: This Ex-Cell-O Precision Two-Way Machine equipped to bore and chamfer cast-iron gear cases. Except for loading, clamping and unloading, this machine is entirely automatic.

Typical of Ex-Cell-O's constant improvement in the field of precision production is this Two-Way Precision Boring Machine.

Operations on the cast-iron gear case illustrated include finish boring seven holes and chamfering diameters at two points. With its new hydraulic control panel each way unit has a greater range of feeds and a higher rate of rapid traverse.

Like all standard Ex-Cell-O Machines, this Two-Way Model is easily adapted at slight cost to a variety of precision setups. For further information, contact the Ex-Cell-O representative in your area, or write, wire or phone direct to Ex-Cell-O, Detroit.

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

57-2

Washington ... NEWS REPORT

U S tools to be made in India?

Possibility of manufacturing American machine tools in India is likely to be surveyed by a team of machine tool industry and government experts, or by an outside engineering firm under the auspices of the International Cooperation Administration and the Commerce Dept, as an aftermath of a conference here February 9.

India now has some 80,000 machine tools in operation, is expected to need 170,000 by 1961. Last year, India produced 2297 tools valued at $2.1 million, imported $15 million worth, mostly (1100 of them) from Britain.

India's 17 machine tool builders today turn out 3000-4000 tools a year. Two government-owned plants have been established with Swiss aid, and the privately owned Hindustan Machine Tools Ltd, has a new agreement with Fritz Werner of West Germany for manufacture of its milling machines and technical assistance. Hindustan's annual output targets to be achieved within six years: 900 lathes, 400 milling machines, and 240 heavy-duty drilling machines. **American builders,** if they should license Indian companies, can't reasonably expect more than 10% in royalties. And before they go into India must ask themselves: (1) how big is the Indian market? (2) what assurance have we that the Indian licensee won't sell U S machines to Russia and her satellites? With any proposed agreement needing Indian government approval, there is slight chance of a "no selling to Communist countries" clause going through.

Ex-Im Loans for metalworking . . .

The Export-Import Bank is becoming an increasingly important source of financing for exports of U S machinery. Last year, Ex-Im extended a total of $1.2 billion worth of credits to foreign governments or individuals to buy U S products. Of this, $500 million went to Britain for the purchase of petroleum products. But about $550 million of the remainder is earmarked for financing exports of American machinery of various kinds.

Much of this money still hasn't been actually spent, and in many cases the foreign purchasers still haven't placed firm orders with U S suppliers. What's more, Ex-Im's volume of lending in 1957 so far seems likely to maintain last year's high level, if you exclude the exceptional emergency loan to Britain.

Types of machinery exports financed by Ex-Im range from transportation equipment, railroad rolling stock, trucks, highway construction and maintenance equipment, port and dock equipment, to power generators, agricultural machinery, mining machinery, and some industrial equipment.

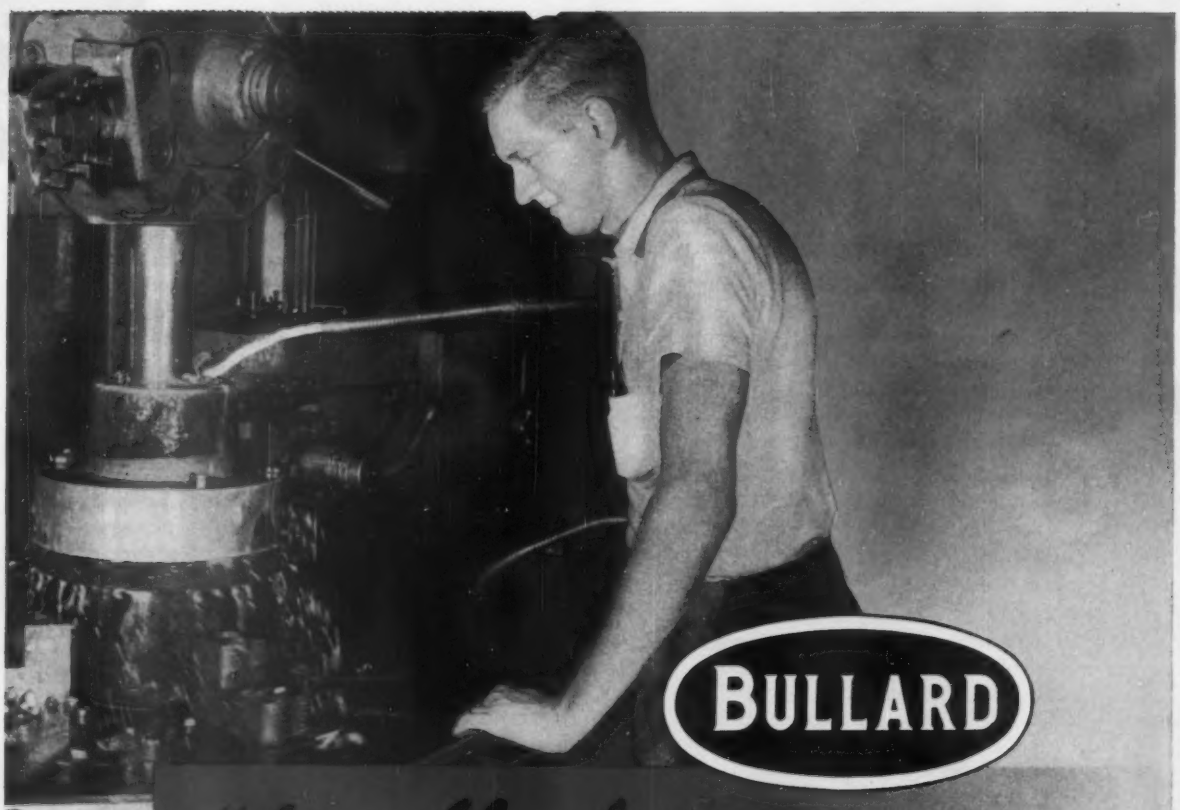
Ex-Im's recent $56-million loan to Argentina for transportation equipment is a typical example of the bank's operations. The loan will go for 150 diesel locomotives, plus hopper ballast cars, repair shop machinery, spare parts, car running gear, trucks and parts for repairing cars, rail anchors and track maintenance equipment, air compressors and other pneumatic equipment, air brake parts, auto-couplers, and tabulators. In addition, Argentina will buy three tug-boats and some items of highway construction equipment.

General Motors, General Electric, and Alco Parts Inc all have submitted bids to Argentina to supply all or part of its needs and a decision is expected soon. Another $44-million Ex-Im loan to Argentina for the same general kinds of transportation equipment is in the works now and probably will be signed soon.

Missile news . . .

First missiles likely to go to Britain under the recent Wilson-Sandys talks are the Western Electric-Douglas Nike air defense missiles; air-to-air missiles such as Hughes' Falcon, Douglas' Sparrow, or the Philco-Bendix-Minneapolis Honeywell Sidewinder. For some time, Britain has been getting some tactical missiles like Douglas' Honest John and Firestone's Corporal; they'll now be getting more of these, plus advanced types like Chrysler's Redstone.

Meantime, the Pentagon is just about ready to drop the Army's Jupiter IRBM project (Chrysler, Reynolds Metals, Ford Instrument are main contractors) in favor of the Air Force's Thor (Douglas, North American, and others) for volume production. Air Force already has operational control over IRBM's. A similar decision seems ready to drop the Air Force's land-launched Talos air defense missile (McDonnell, RCA, Philco, etc) in favor of the Army's Nike Hercules (Western Electric, Douglas). Over $150 million has been spent to develop Jupiter, covering more than 300 contracts. The Air Force says Thor is "already being fabricated on production tooling."



BULLARD

"Less Maintenance—
Less Down Time
Increased our Production"

This statement by Methods Supervisor Raymond Hoss of the Ingersoll Milling Machine Company of Rockford, Illinois summarizes one of the benefits they received from the purchase of a 36" Cut Master V.T.L., Model 75. Less operator fatigue, higher speeds, power chucking and power indexing turret are other factors which increase the overall production obtained with Bullard Cut Master, Model 75.

These same benefits can be applied to your production problems—just call your nearest Bullard Sales Engineer—he'll be glad to help—or write

THE BULLARD COMPANY
BRIDGEPORT 9, CONNECTICUT

Detroit ... NEWS REPORT

Some facts about gas-turbines . . .

Behind the smoke and fire of the professional publicists' broadsides on gas turbine progress, now that both Ford and GM have announced a gas-turbine powered truck, are these facts:

• **The industry is solidly agreed** that turbines will first appear in trucks because turbines operate most efficiently under heavy load. Size, when coupled with horsepower, is still a problem, especially in the free-piston engine, which is a form of turbine.

• **One group of experts feels that the turbine** will be here in four or five years on the grand scale. Another group feels that five years is a more accurate timetable. Still another clique of experts thinks that the turbine will come into its own only when the bugs have been ironed out—and no one, they say, can tell within several years just when that will be.

• **Critical metals no longer offer a problem.** Giant steps forward in metallurgy have seen to that. While turbine wheels still require strategic materials, those materials today are so far down on the priority list that they can just about be ruled out as strategic. But that's no indication that metals that are comparatively easy to get today will be easy to get in the future.

Most experts agree the best way to produce a turbine wheel is by investment casting. The methods are well known, and they're both cheap and easy to adapt to autodom's mass production methods.

On design the industry is divided. One group thinks that the present gasifier turbine design must go because the rotating heat generator won't stand up for 100,000 miles of trouble-free operation. Not only that, it costs too much for materials and fabrication.

Another group feels that there's nothing wrong at all with the regenerator, and that new materials (the regenerator uses stainless) could bring the price down.

Too expensive to run?

And on the subject of economy, some authorities think the gasifier turbine is too expensive to operate to warrant its adoption instead of the free-piston engine. With turbines, not only must gallons-per-mile be considered but the elimination of spark plugs, fan belts, anti-freeze, and the need for frequent oil changes are factors in the gas turbine's favor.

What about tooling?

The auto industry is pretty much in agreement that tooling up for a gasifier turbine would cost just about the same as tooling for a brand-new V-8 engine, and that tooling for a free-piston engine would run considerably less.

Said one research expert: "Granted we have a large investment in piston-engine tooling that we must first use up. But tooling for a turbine engine is not an impossible thing: what we need primarily is an end to thinking it can't be done —that it is too expensive. Tooling engineers should take a fresh look at the problem, bring to it a fresh viewpoint."

Summing up: most authorities think some sort of turbine will make its appearance as an optional item on cars five years from now. It will come first in trucks, later in automobiles.

When it comes, the turbine will spark big changes in the auto industry. It will mean new engines, of course, plus new drive trains, transmissions, and rear axles. It could spell out a complete new era for the tooling people.

The production scene . . .

General Motors production fell off in the week of February 11, but the rest of the industry held to its high-level output. Chrysler Corp nameplates were running far ahead of 1956 levels, and the Ford makes were doing right well, too.

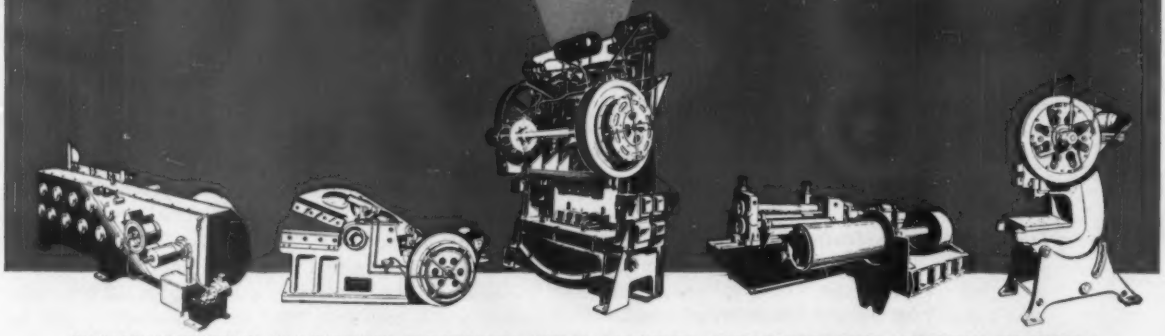
Chevrolet showed the biggest production drop of the GM family as the week closed—down 21.5% from the previous figure. Cadillac dropped 12% in February from its January output. Buick was on the comeback trail—up to 12,000 units a week, but still 3000 units a week under its February 1956 levels. Oldsmobile, too, was snapping out of its doldrums with the highest output since mid-December. Production was pared 9% at Pontiac in February.

The picture at Chrysler Corp is bright: Plymouth is on a six-day workweek. Dodge, DeSoto and Chrysler production is staying high. Imperial is turning out more than 1000 units a week, and Chrysler first quarter production is slated to run 45% ahead of the comparable 1956 period.

The independents are doing about as well as might be expected. At AMC, joint output of Nash and Hudson is less than 200 a week, with Rambler's firm 2000-units-a-week output holding the fort. Studebaker is running at a 1200-units-a-week level, and Packard is averaging 450 units per week.

OPERATORS IN THE METALWORKING INDUSTRY HAVE PROVED THAT

IT OPERATES BEST WHEN FAWICK-EQUIPPED



METALWORKING MACHINES EQUIPPED WITH FAWICK CLUTCHES AND BRAKES PROVIDE BETTER PRODUCTION, WITH GREATER OPERATING SAFETY AND LOWER MAINTENANCE.

Extensive job studies have proved that FAWICK's accurate clutch operation and control result in increased production, reduced scrap losses, less operator fatigue and less machine down-time.

The aggressive FAWICK program of power transmission product development and the expansion of FAWICK field engineering facilities, are designed to increase your machine production and efficiency. The nearest FAWICK representative or the Home Office will show you how quickly and easily this can be done. Remember—your machines will operate *best* when FAWICK-EQUIPPED!

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INDUSTRIAL CLUTCHES AND BRAKES

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Machine tools ...

Most users do not pay rent . . .

No rental is being paid to the government on 125,000 machine tools owned by the armed services and installed in contractors' plants. Only about 20,000 government-owned machines in private plants are now yielding a monthly rental to the Department of Defense.

A movement is on in government circles to see that Uncle Sam gets rent from every one of the 145,000 machines out in industry.

A uniform rental rate would be charged and the revenue derived from the rents would go into a revolving fund that would be used to finance replacement of old, obsolete government machines with new ones.

The monthly rental charge would not be the prevailing rate today, which ranges from 1% to 2%, according to the age of the machine. It would be lower, possibly being a straight 1%.

Legislation by Congress would be necessary to get this plan going and to keep it in operation. The proposal is said to have the backing of all members of a government inter-agency task force, except the Defense Department, which is adamant in its opposition. Pentagon looks upon the plan as unworkable and unrealistic.

Pentagon voices objections . . .

It does not like the idea of using this plan for spending money outside its own budget. It objects to the onerous job of collecting cash from every contractor monthly as tool rental. It believes that the present arrangement, whereby most tools in private plants do not return any rental in dollars, has distinct advantages.

Pentagon spokesmen say that contractors are not getting the use of government machines for free. The contractors' possession and use of the machines result in the armed services securing lower prices on munitions. The government thus is being adequately compensated, despite the fact that no actual rental is exacted.

Pentagon also feels that the present rental rates should be retained, because lower rentals are not in keeping with the rates charged by industry. Office of Defense Mobilization is spearheading the drive for adoption of the plan.

Congressional committees take a rather dim view of any program built around a revolving fund, the plan's critics say. Yet such funds are in existence, with Congressional approval, the plan's proponents contend.

It is hard to tell at this point whether the entire plan, including financing of machine tools for replacement purposes, has any chance of adoption. Unless Pentagon can be won over to some form of support, observers feel that the plan will have rough going. The armed services, after all, own 293,000 out of a grand total of 323,000 government-owned machine tools.

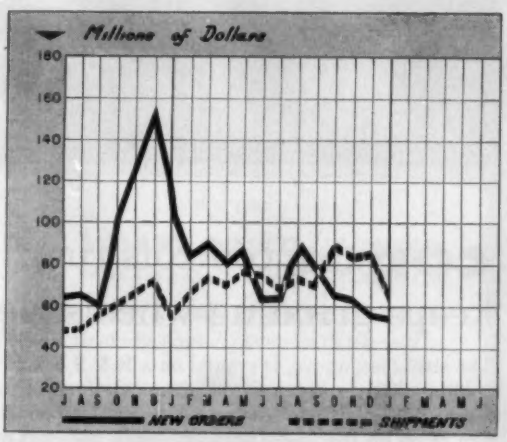
Navy, Air Force and Army each has about one-third of the 293,000 units.

About 235,000 out of the 323,000 government tools are in use either in private industry or in government arsenals, yards and maintenance shops. Armed services themselves have some 90,000 machines in use.

58 big millers unassigned . . .

Of some 165 big skin millers and profile millers on order with four machine tool builders by the Air Force, 52 have received a certificate of approval for delivery to a stated contractor, 55 are being held for specific users (but could be shifted to some other contractor when the approval comes through), and 58 are unassigned.

All of these machines are being equipped with numerical control. None of the units has yet been delivered.



MACHINE TOOL NEW ORDERS AND SHIPMENTS both fell off in January from December levels. New orders continued the downtrend they have experienced since last August, with net new orders registering $57.2 million on the National Machine Tool Builders' Association Index. Shipments dropped from a high fourth quarter 1956 plateau to $76.6 million in January

CODOL

LIQUID GRINDING COMPOUND

Lubricates
as it cools . . .

CODOL controls rust, keeps grinding wheels clean

The steel disc, above, is ground on a B & S No. 11 face grinder, holding .0001 in. flatness tolerance and three to four microinch finish. Stuart's Codol Liquid Grinding Compound leaves a fine film of oil on precision-ground surfaces, prevents oxidation, and eliminates a cleaning problem. Lubrication at the point of contact between wheel and work reduces friction . . . prevents wheel loading . . . eliminates heat stresses and surface checking.

With Codol's extra detergency, lubricity, and cooling qualities, you can hedge against high maintenance and operating costs . . . assure maximum profit return through higher quality work at lower over-all cost.

The fine finish and accuracy built into a Brown & Sharpe grinder is ground *on* a Brown & Sharpe grinder . . . with the help of Stuart's Codol Liquid Grinding Compound! Pioneer in precision since 1833, this company recognizes the importance of all three major functions of a grinding compound: (1) lubrication to prevent generation of excess heat, (2) cooling capacity to dissipate heat rapidly, and (3) balanced surface tension to flush chips away from the wheel and work.

Codol's premium-quality petroleum base provides the high lubricity needed for applying high unit pressures made possible by modern grinding machines and wheels . . . lubricity which eliminates heat stresses and is so essential to accuracy, finish, and wheel economy. Codol's carefully balanced surface tension flushes chips away from the wheel and work . . . prevents wheel loading, heat distortion, and surface checking.

Don't sell grinding fluids short when you are looking for "tenths" in accuracy . . . for smooth ground surfaces which are not work-hardened . . . for maximum wheel life . . . and for rust protection for machine parts, tooling, and work. Take the lead of this precision machine-tool builder, a company that knows how to get peak performance from grinders!

Helps Brown & Sharpe Mfg. Co. produce fine finish precision parts at minimum wheel cost!

Steel motor shafts are held to .0005 in., grinding 100 pieces per hour on a Brown & Sharpe No. 12 plain cylindrical grinder. Stuart's Codol liquid grinding compound is used in more than 100 different grinding machines in this Providence, R. I., plant.

Brown & Sharpe No. 1 universal grinder finishes 45 deg angle on machine-tool rollers at the rate of 200 per hour. Accuracy is held to .0003 in. Codol keeps wheel open and chips flushed away to produce finishes as fine as six microinches, rms.

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Arrange now to test Stuart's Codol on your difficult precision grinding jobs.

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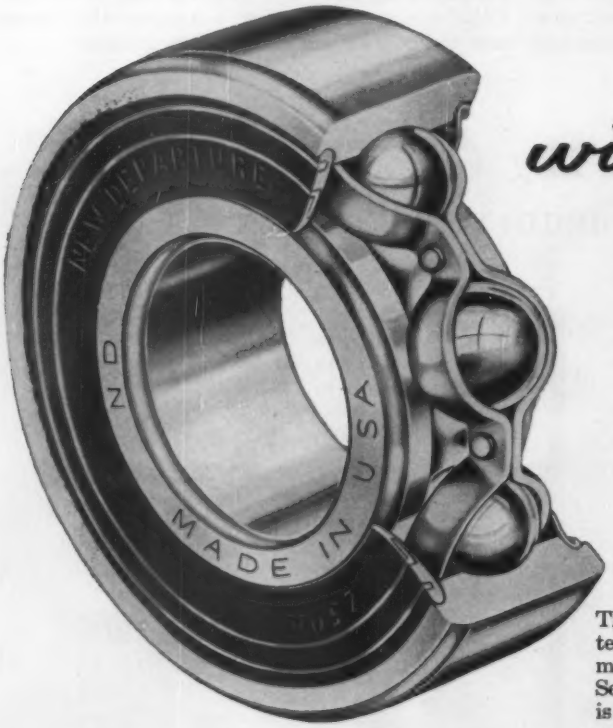
METALWORKING LUBRICANTS

FACTS

about

NEW DEPARTURE BALL BEARINGS



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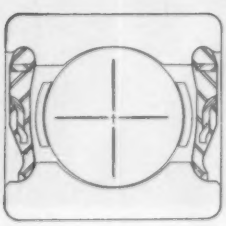
SENTRI-SEAL

on guard against dirt and wear!

The unique design of the Sentri-Seal gives optimum protection against dirt, and includes a number of other major advantages.

Sentri-Seals can be removed, easily replaced. As the seal is of synthetic rubber in which two metal rings are embedded, a constant-rate spring is created between the rings. Inherent flexibility prevents distortion of the bearing outer ring due to seal insertion, permitting the use of bearings to the higher accuracy specifications. The spring action maintains an efficient sealing contact with the bearing ring to bar dirt and retain lubricant. Sentri-Seals are relatively inert to oils and greases and operate satisfactorily through a temperature range of −40°F. to 225°F. Specifications available for still higher temperatures. In applications where relubrication is desired, it is easily accomplished by the injection method.



The diagram shows in section the New Departure Sentri-Seal. Lip-contacting surfaces are form-ground simultaneously with the ball race, giving an extremely high degree of concentricity between sealing surfaces and the raceway.

SEE "WIDE WIDE WORLD" SUNDAYS—NBC-TV

Sentri-Seal is available for a range of sizes in single-row, standard-width bearings and also in two types of New Departure adapter bearings. Sizes, dimensions and capacities are listed in the latest New Departure catalog.

Write for full details on Sentri-Seal

BALL BEARINGS MAKE GOOD PRODUCTS BETTER

NEW DEPARTURE • DIVISION OF GENERAL MOTORS • BRISTOL, CONN.

What's ahead ... in Metalworking

NEWS REPORT

Soft spots are the exception, not the rule ...

U S industrial production continues to run along in high gear and it gives every evidence of continuing to do so in the foreseeable future. And while some economic soft spots have shown up in Metalworking and industry generally, business by any standards is good, despite current unease stemming from a shaky stock market, and too much loose talk in high places in Washington.

Take appliances, for example, while newspapers and financial journals are quick to report that retail sales are below year-ago levels, what they don't tell you is that manufacturers' orders are picking up to the point where such major appliances as refrigerators are slowly forging ahead of 1956 levels. This is principally because of a much healthier inventory situation among manufacturers, distributors and dealers. Result: appliance people are most optimistic about the outlook for the rest of the year.

Aircraft output high ...

Aircraft production is still moving along at a fast, steady clip, although some reshuffling of suppliers and subcontractors is anticipated because of the government's shift to emphasis on guided missiles rather than aircraft for defense.

Aircraft parts suppliers report, however, that while sales are going up, intensified competition, particularly on defense work, is whittling down on net profits. Too, there is a growing tendency on the part of major aircraft manufacturers to do more subcontract work in their own plants.

The automotive production picture is a mixed one—with GM taking its biggest production drop of the year, and the rest of the industry either holding its own, or like Chrysler Corp, running full steam—well ahead of last year.

Shipbuilding has come out of its serious years-long slump with a rush. East Coast yards are reported so busy that excess business is spilling over into West Coast yards. Last year, most private shipyards starved along on repair work, even "took in washing" such as odd jobs of steel fabricating. It's a far different picture this year, with shipyards on both coasts humming with new ship construction. And for the first time in years, shipyards are adding to their workforces instead of cutting them.

Steel orders picking up ...

The big steel producers now report that orders for second quarter deliveries are picking up to the point where the industry expects to be scheduled to capacity for some months to come.

Plate, structural shapes and reinforcing rods are currently in short supply, but all other steel products can be classified as "soft." One steel producer is seriously considering rolling thin plate in its sheet mills in the event that demand for sheet should fall so much below capacity that the mills might be idle for some time. But so far, sheet demand hasn't fallen off to levels where that move would be desirable.

Steady climb in steel scrap prices to a record high of $59 a ton (for No. 1 heavy melting) has finally broken—with a sudden drop to $55. One reason for this is the refusal of big users to pay high prices, which are the result of big foreign purchases, notably by Japan.

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AMERICAN MACHINIST INDEX OF METALWORKING PRODUCTION

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

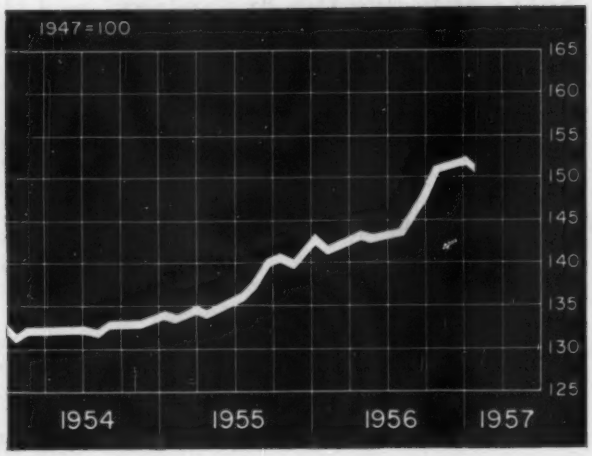
	JAN. Esti-mated	DEC. Pre-liminary	NOV. Re-vised	DEC. Year Ago
Total Index	**181**	**181**	**181**	**170**
Machinery	154	154	154	147
Electrical Machinery	215	217	217	196
Autos	150	152	152	152
Other Transportation	338	336	336	298
Other Metalworking	145	144	144	140

NEWS REPORT What's ahead . . . in Business

AMERICAN MACHINIST INDEX OF METALWORKING PRICES

	JAN. Estimated	DEC. Preliminary	NOV. Revised	DEC. Year Ago
Total Index	**151.5**	**151.1**	**150.5**	**141.5**
Metalworking Machinery	**174.4**	**174.4**		**160.9**
Other Machinery exc. Electrical	**159.5**	**159.0**		**148.1**
Electrical Machinery	**152.0**	**151.4**		**137.8**
Fabricated Metal Products	**143.2**	**143.3**		**136.0**

152



Don't let stock market dips fool you . . .

Does today's wavering stock market signal the end of the greatest boom in U S industrial history? Wall Street insiders don't think so, nor do economic indicators point that way.

While the stock market may dip a bit more before it stabilizes, Wall Streeters are of the opinion that a little good news could go a long way toward allaying investor fears for the effects of today's squeeze on profits and lack of ready money for industrial and commercial expansion.

And some of that good news is already on its way. For instance, many insiders feel that the Federal Reserve's clamp-down on credit has already accomplished much of what it set out to do—stem inflation—and that financial purse-strings may be loosed sooner than we think.

Congress, for example, has just okayed allotting of $500 million more in U S Treasury money to "Fannie Mae" (Federal National Mortgage Association)—the outfit that buys up federal-insured mortgages from the lenders so that they can channel their capital into new loans.

That means a tremendous shot-in-the-arm for the residential construction field, and while home mortgage money will stay pretty tight through this month, you can look for a spring credit ease-off that should do much to offset the current drop of 6% from 1957 home-building levels.

Also in the good news bracket are the vaulting rise in industrial construction (now around $270 million a month); all-time-record nonfarm employment; highest Gross National Product in history; a $1-million gain in retail sales in January 1957 over 1956; growing federal spending—and the fact that the average American today has more money with which to buy goods and services than any average citizen in history.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-1949=100)*	150.8	151.0	150.7
Steel ingot operation (thousands of tons)	2,456	2,504	2,459
Electric power output (million Kilowatt hours)	11,920	11,946	11,277
Production of automobiles and trucks	169,531	179,835	156,293
Engineering construction awards (Eng. News-Record—millions)	$321.2	$374.7	$355.8

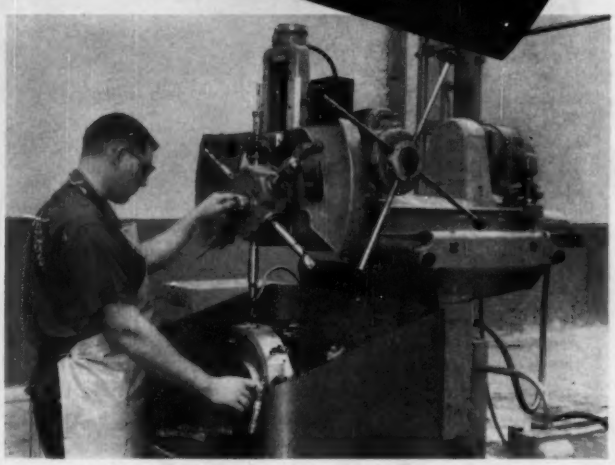
MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Index of industrial production (1947-1949=100)*	146	147	143
Index of durable manufacturers' production (1947-1949=100)*	164	166	160
Durable goods manufacturers' sales, millions*	$14,390	$14,321	$13,688
New orders for non-electrical machinery*	155.9	131.0	128.1
New contracts for industrial construction	202	196	166
Machinery manufacturers' sales, millions*	$ 4,084	$ 4,162	$ 3,648
Durable goods manufacturers' new orders, millions	$14,439	$15,130	$15,605
Machinery manufacturers' new orders, millions	$ 4,013	$ 4,436	$ 4,118

* Seasonally adjusted

CONVAIR *Brand* *SWISS CHEESE* *by* BURGMASTER® turret drills

Here's how CONVAIR managed this precision work: "The manifold consists of a multi-hole pattern in a magnesium disk over one foot in diameter and almost two inches thick. These holes, to be produced on both faces and the periphery, varied both in depth and diameter, requiring many single and combination tools and taps; all to be held to close tolerances. The solution to this task was found in a tandem of three ram type BURGMASTER radial turret drills. These versatile machines allowed us to produce all the required machining with a minimum of set-up, tooling, operation time, transfer time and maintenance."



The Burgmaster Model 2 BR (6 Spindle) Ram Type Radial Turret Drill with Automatic Power Clamping features power indexing and a new sensitivity in handling. When the ram is clamped in position, the 2 BR can function as a deep throat production turret drill, easily handling holes up to ¾". The machine has a 250° radial movement with maximum and minimum radii of 42" and 15", respectively.

For complete details, write Dept. AM-3

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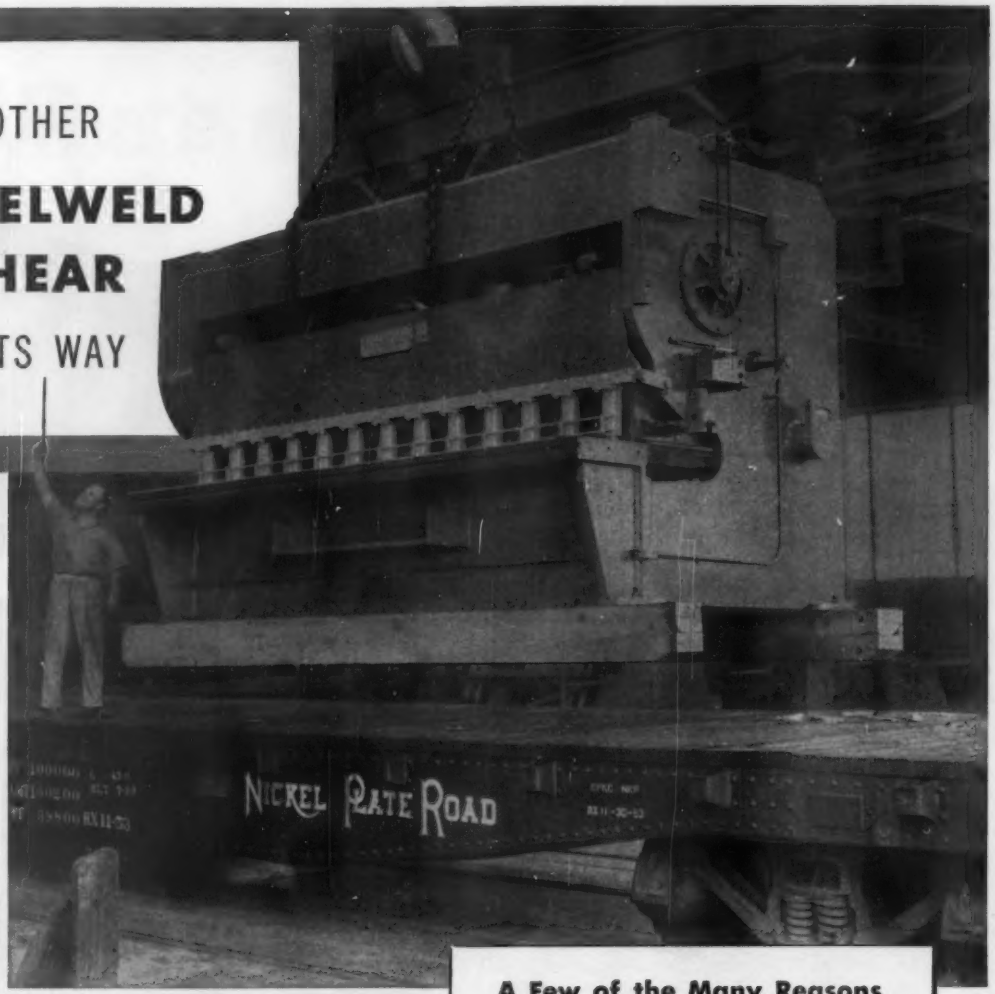
ANOTHER

STEELWELD SHEAR

ON ITS WAY



From every angle a Steelweld shear looks good — and is good. This machine is rated for 12′-0″x½″steel

SHIPMENTS are being made at a rapid rate to all parts of the country because more and more users are learning of the many merits of Steelweld Shears and are talking about them. As the words of experience spread about and comparisons are made, more and more people come to realize that Steelweld Shears are really outstanding.

For smooth, accurate burr-free cutting, Steelwelds can't be beat. For ease of operation they have no peer. Their heavy construction and means for simple, easy maintenance assure long trouble-free life.

For the finest in shearing, you can't make a better selection than Steelweld. Say the word and we'll have one of these wonderful machines on the way to you.

A Few of the Many Reasons For STEELWELD'S DEMAND

1. Pivoted-blade operation. Entirely different from every other shear. No slides or guides to wear and cause inaccuracies.
2. Micro-set knife adjustment. Quick easy knife-clearance adjustment for every plate thickness. Something not matched elsewhere. Be sure to get the complete story on this.
3. Mechanical hold-downs. Tight gripping, non-leaking, quiet operating.
4. Accurate easy operating back gauge rides on ball bearings.
5. Cool-operating, long-life, low-inertia clutch and brake.
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AVAILABLE FOR PLATE LENGTHS TO 24 FEET AND THICKNESSES TO 1½ INCH

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STEELWELD PIVOTED BLADE SHEARS

American Machinist

MAGAZINE OF METALWORKING PRODUCTION • ESTABLISHED 1877

It Is Only the Sniffles

We have been treated lately to a curious phenomenon. Our robust economy has been viewed by newspapers, public officials and certain observers as being on the verge of contracting a debilitating malady.

Various self-appointed physicians have been taking its pulse, tapping its chest, recording its heart beats and testing its blood pressure. They seem very sure that something is wrong.

Just what is the condition of our economy? Is it on the verge of being laid low by the first virus to which it is exposed, or does it have a built-in resistance that may give it little more than the sniffles?

If it is Metalworking . . .

that interests you, our guess is that any prospective illness is not likely to get beyond the sniffles stage. Suppose we do a little examining of our own.

Metalworking production is at an all-time high, except for World War II. It is ten points higher on the *American Machinist* Index than at the peak of the Korean defense program.

Backlogs of machinery builders of all kinds run to many months. Makers of heavy electrical machinery are booked far into 1958. Output of durable goods will continue to push plant capacity in many metalworking segments.

There is less assurance of sustained top operations in consumer goods, which are sensitive to the public's prevailing buying moods. Nevertheless, no sizable drop-off is in sight.

We think of no substantial reason . . .

for altering the prediction made months ago that Metalworking in 1957 probably will do a slightly bigger volume of business than in 1956, the previous peacetime peak. Even if production should sag a little in the second half, and that won't necessarily happen, the year's total should match that of 1956, at the worst.

Now as to new orders, the outlook is not quite so rosy as in production. On the other hand, demand continues strong and inquiries are plentiful. Sales of many kinds of metal goods, and of industrial machinery too, are huge by normal standards. There are no signs of anything more significant than a brief breathing spell, and not much of a one at that.

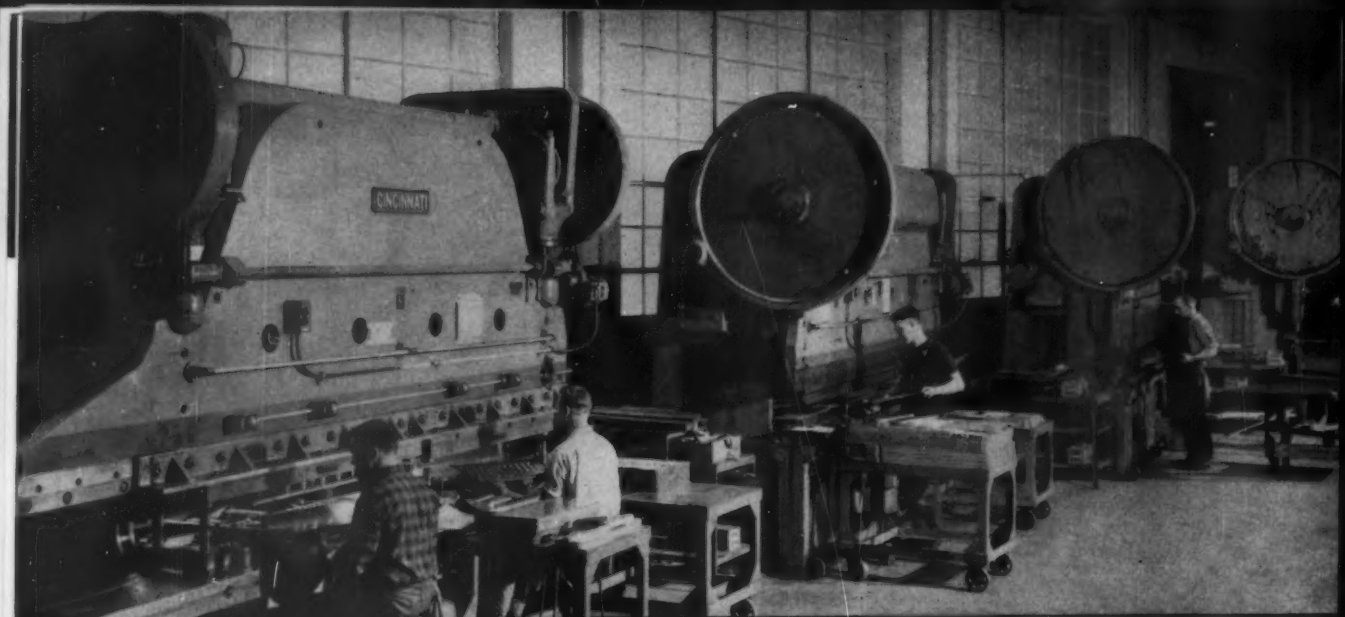
Sure, money rates are up and credit is harder to get. Sure, the stock market has gone through a fairly good shaking down. Sure, manufacturers and their sales agents are having to go out and dig for business. Sure, the automobile industry is not yet putting on a performance worthy of loud cheering.

But we are about as close to full employment as we will ever get (have you tried to hire skilled men or engineers or any kind of help lately? People's incomes are high and the consumer is spending his money (Florida vacationers are sleeping in their cars and in hotel lobbies because hotels, motels and tourist homes are full to overflowing). Retail sales all over the country are very high.

No, we don't go along with . . .

those diagnosticians, amateur and professional, who predict that our economy is about to take to bed with a high fever that may linger quite a while. We think that it only has the sniffles and that they won't last long. In fact, we wouldn't be surprised if the economy, and that goes for Metalworking too, might be feeling very fine later in the year, thus confounding the pessimistic pulse-holders.

Burnham Finney EDITOR



at THE TRANE COMPANY, La Crosse, Wisc.

Steel tube support plate for cooling coils

BATTERIES of accurate CINCINNATI Shears and Press Brakes cut production costs

Three Cincinnati Shears and four Cincinnati Press Brakes are profitable producers in this finely equipped shop.

The battery of shears produces accurate blanks, sheared to micrometer accuracy, which are later formed and pierced on the Cincinnati Press Brakes.

The photo above shows multiple holes being pierced and extruded to a tolerance of ±.002" in a steel tube support plate for Trane cooling coils. On this operation alone, floor to floor time ***was cut from 3-1/3 minutes to 1/2 minute*** by the use of Cincinnati Press Brakes. The speed and outstanding accuracy of these Cincinnati Machines have lowered costs and increased quality of the air conditioning equipment manufactured by this leading company.

Write **Department A** for Catalog S-7R on Cincinnati All-Steel Shears and Catalog B-4R on Cincinnati Press Brakes. We also suggest you consult our Application Engineering Department about your shearing and forming problems.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

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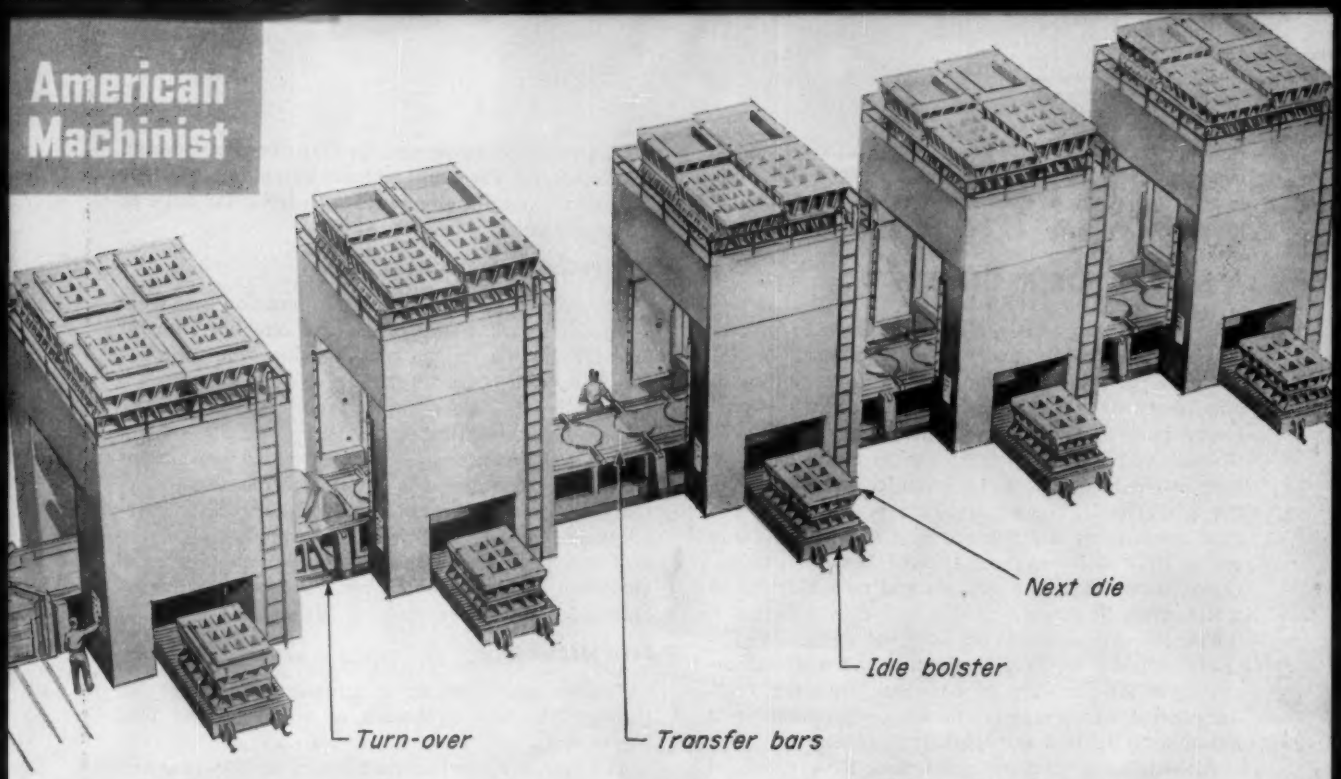


Press line of the future? — An automated bottom-drive press line equipped with moving bolsters can be worked into a three-level layout—*basement* for efficient scrap disposal and press maintenance, *main floor* for production of stampings, *overhead* die storage either atop presses or on platforms. Die storage area on top of presses economically can be increased by installing overhead platforms between the presses. This is feasible because dies are set at sides of presses instead of between the presses. Raising building height is cheaper than adding ground-level die storage

New concepts broaden use of press automation

GORDON M SOMMER, chief development engineer, CLEARING MACHINE CORP, CHICAGO

These ideas will permit all three categories of stampers—low, medium and high-volume—to get into automatic production of stampings. For the means are at hand to obtain the three essentials in a press line:

1. **Automatic transfer of the part**
2. **Flexibility for various jobs**
3. **Rapid die changes**

WHAT WE HAVE USED—

To broaden the usefulness of press-shop automation, we must introduce versatility and simplicity. The jobbing stamper and the low-volume shop can't often apply the standard and special automation, or materials-handling, devices developed from the prototypes first disclosed 9 years ago (*AM* —Oct 21 '48 p107). Very high efficiency has been obtained from this kind of automation in automotive plants, but the press lines are subject to breakdowns because each line requires a multitude of relays, air valves, solenoids, air cylinders, and motors, plus a complicated electrical control panel. Further, the changeover to another type of stamping can be costly and time consuming, to say nothing about obsolescence or expensive rebuilding of some of the automation devices.

WHAT WE NEED—

A properly oriented approach to efficient stamping production must consider several important factors. Not only must a means be provided to produce stampings at a high rate of production with minimum manpower, but means must be provided so the changeover time from the production of one stamping to another is reduced to a minimum. This changeover must be accomplished in minutes rather than hours. Furthermore, automatic press equipment

must be completely flexible. True flexibility means the equipment is able to produce a variety of stampings today, and a completely new or redesigned product tomorrow.

A MODEL FOR PROGRESS—

It has long been recognized that transfer presses are well adapted to efficient high-speed production. Transfer presses are designed to perform numerous operations on a stamping and thus produce a completed part within one press. In this type of press, the part is transferred from station to station by a feed mechanism, which is mechanically driven from the press itself. Synchronization of the press and feed mechanism is automatic and consistent. There are no limit switches to be tripped, no relays to operate, no air valves to actuate and no air cylinders which must be timed.

Transfer-press operation involves definite right-angle motions, which give positive and accurate indexing of the part. The part is therefore always under control, which may not be the case in much press automation devised and used since 1948.

Although the transfer press does have excellent features for many classes of work, there have been some drawbacks. First, the transfer press has been limited to parts with a flat flange or edge, and the fixed station centers could not be changed or adapted to larger dies, when the latter were needed. Example: Presses bought several years ago for automobile air cleaners are now obsolete (before being worn out) because the designers of motor cars now want a flat, very large diameter air cleaner. However, recent improvements in transfer-press design developed by Clearing include adjustable stations and permit handling of parts with irregular edge or flange contours.

LINE BECOMES A TRANSFER PRESS

Our present concept of press automation is to treat a line of straight-side presses as one big transfer press. By doing so, we can introduce the required simplicity and versatility.

Actually, the line is nothing more than a transfer press with the station centers increased.

Because the transfer mechanism is continuous from press to press, it is possible to put in an auxiliary operation operation that will also be automated. For example, a hydraulic or mechanical punching unit can be inserted in the line for an incidental operation, or one that cannot be economically included in major dies.

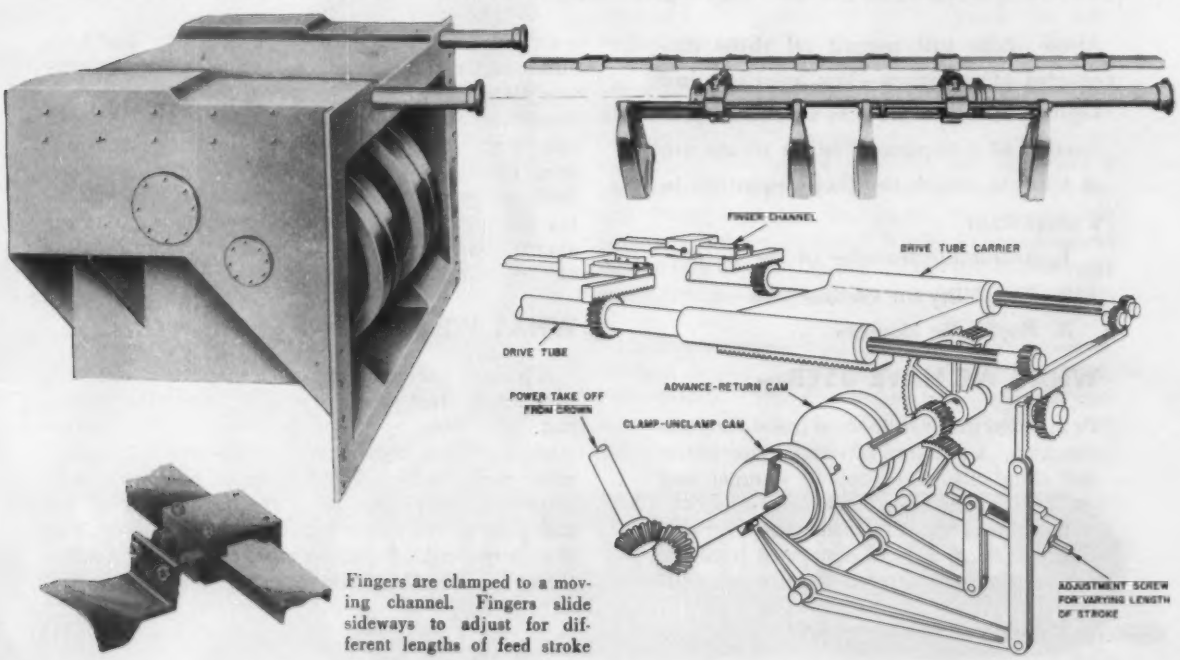
FEED MECHANISM

Presses can be set up in a row and the work fed through the line by means of an integrated feed mechanism.

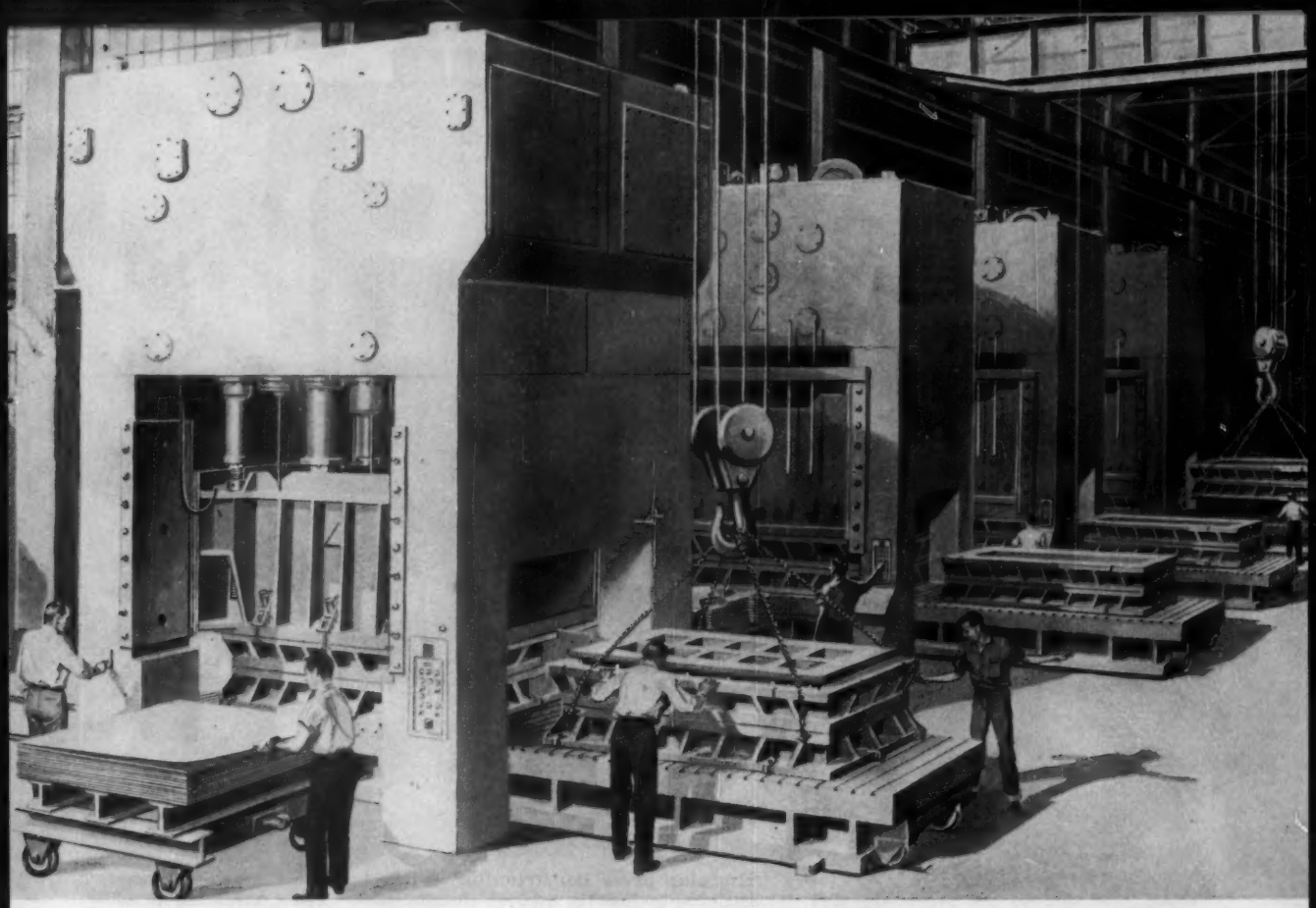
The transfer mechanism consists of two channels and drive tubes. These elements are sectional, to facilitate changeovers. Advance and return of the tubes is actuated by cams in a gearbox somewhere in the line. This gearbox is powered by an adjustable-speed motor through a clutch and brake, and operates continuously. It is electrically interlocked with press controls to insure that the feed and the presses are synchronized at the top of each stroke.

Finger assemblies are attached to a channel above

Transfer feed easily adjusted — With a change of job, the feed fingers and moving channels are changed and the feed stroke is adjusted for length. On a 5-press line, one stamper found that conventional automation needs 96 min. for a changeover and services of 11 men, whereas the simple shuttle bar feed shown takes 23 min. and needs only 4 men for a complete changeover. The feed mechanism is constructed in incremental lengths. One of these standard assemblies is shown below. The main gearbox containing the drive cams is shown at left. Feeds of various lengths can be assembled by bolting together as many standard units as necessary. Each unit is supported by two pairs of brackets which are attached to the bolster plate or bed



Fingers are clamped to a moving channel. Fingers slide sideways to adjust for different lengths of feed stroke



Rapid die changes — When one stamping is being run, die handlers place the next set of dies on the double-width power-driven bolsters. When ready for the change, the bolsters are unlocked and power driven through the uprights until the second set of dies is in position at each press. Then the first set of dies can be removed and exchanged for the next job

each drive tube. As the drive tube moves forward it carries the channel with it. Rotation of the drive tubes causes racks and pinions to actuate the feed fingers for clamp, lift, lower and retract motions.

Motions of the feed fingers are:

(1) clamp, (2) lift, (3) forward index, (4) lower, (5) retract, and (6) return index.

MODULAR TRANSFER PRESSES

The basic concept of a transfer press has been extended in another direction—modular press design. As we said, certain transfer presses were obsoleted because they could not accommodate the larger station centers required by air cleaners. To cope with product changes like this, upright presses of modular design permit an additional unit to be added to an existing press, and the feed tubes extended. We now have a new composite and integral press ready to produce a greatly changed and redesigned part.

By combining the feature of adjustable station centers with modular construction we achieve the ultimate in long-range transfer press flexibility.

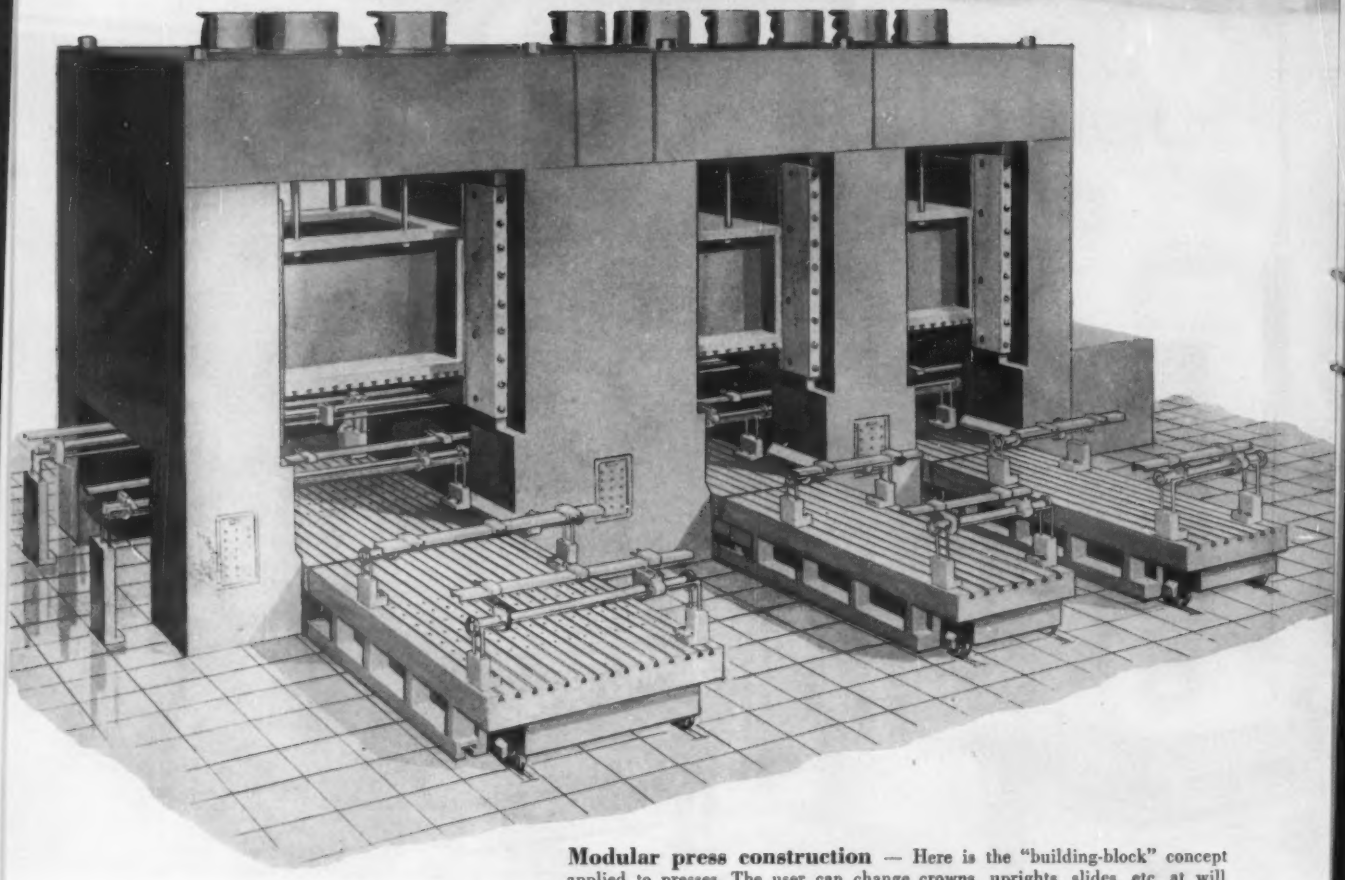
PUSHBUTTON DIE-SETTING

Rapid die changes can be realized by employing two bolster structures at each press, and mechanically connecting them so that they can be power driven through the press uprights. Thus, the die for the next product run can be set up on the idle bolster while the other is in the press. Then, when the first run is completed, the bolster assembly is actuated to put the new die into the press and carry the old one out to unloading position. This changeover normally can be completed in less than 30 min.

Pushbutton die setting is equally adaptable to either unit transfer presses, modular transfer presses, transfer press lines, or individual manually or mechanically fed presses.

With pushbutton diesetting, the old dies are removed and the new ones secured in the press completely automatically and by pushbutton control. Because the dies are loaded at right angles to automation and since the automation consists of straight-line motions, the automation changeover consists merely of replacing sets of feed channels. These channels, with the appropriate feed fingers, become part of the tooling setup and are, in essence, a part of the die equipment. Dies can thus be changed in complete lines of presses simultaneously, without any waiting for overhead cranes or die trucks. The punches are clamped to the slide, or slides, by the use of power or manually operated punch clamps.

To appreciate the impact of pushbutton die setting in a particular stamping plant, and to get an image of how it will affect production costs, it is strongly



Modular press construction — Here is the "building-block" concept applied to presses. The user can change crowns, uprights, slides, etc, at will to make a new arrangement for a different job, or add sections if more operations are needed. Here, moving bolsters are used to load dies from the side of a line equipped with a transfer feed through the uprights. For long production runs, and when die changes are infrequent, the movable bolsters can be omitted. Parallel structures on top of movable bolsters are sections of parts-transfer automation, which connects with rest of line when bolsters are moved into presses. Mounting components in this fashion saves installation and alignment time

urged that manufacturers compare the net and gross cost of their stampings. By net, is meant the actual cost of producing stampings. It is based on per hour cost of press, and includes direct transfer to assembly line. Press cost should be prorated without any factor for percentage of utilization.

Gross cost means the cost of the stampings, as delivered to the assembly lines, and includes all handling and storage costs, die setting, etc. Many companies find that the gross cost is usually more than double the net cost. When thus analyzed it usually is found that pushbutton die setting offers as much or more production-savings potential, as does automation.

WHO CAN APPLY THESE IDEAS?

What do the time savings realized by these concepts mean to our three categories of shops?

The jobbing stamper can get much greater utilization out of his press if it is equipped with a pushbutton bolster. Example: production runs of under 100 pieces are common in the aircraft industry. In many cases, an airframe maker can boost utilization of a press from 15% to 85% because of rapid die changes permitted by the double-bolster. In other words, one machine will now do the work of five.

A jobbing stamper utilizing both the pushbutton die-setting principle and transfer automation can afford to make product changes every 4 to 8 hr.

Even in high-volume plants a press line does not necessarily run month in and month out on the same part. Some of the lines do; others may run for a day or two, or a week on one item, and then be changed to another job. Time saved on the change-over operations in effect adds to plant capacity.

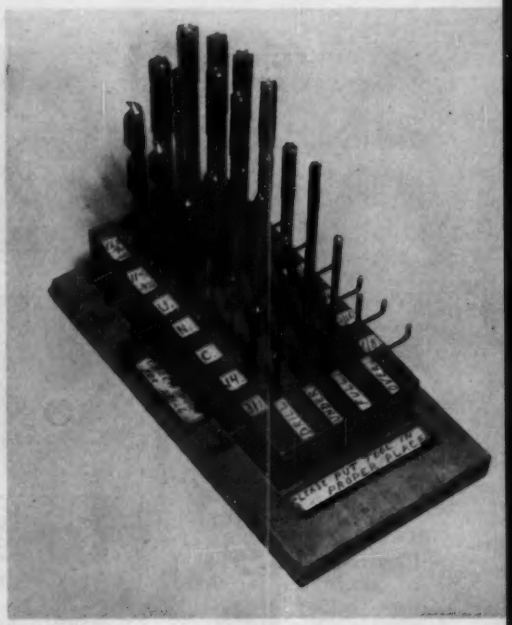
SEEK OTHER IDEAS TO REDUCE GROSS COSTS

We have considered only a few of the basic concepts which have been brought to fruition in the past few years. Adjustable cushion positions, adjustable knockout positions, split slides, new types of clutches for improved drawing actions are but a few of the ideas devised in the last ten years. This decade has been one of the most forward-looking eras in press design and in the application of better and more productive press tooling. As a result, the press-shop operator who would remain competitive should keep abreast of these new ideas, and see how they will affect the gross cost of stampings as delivered to the assembly line or shipping platform.

Let's straighten out this tool-identification mess!

Any time you try to pick out a gage or tool you run into the same problem: Identification. Either the original marking has worn off or was never there in the first place, or all the containers on the shelf are marked differently. Result? Complete confusion. Solution? Simplify, standardize—and above all, use common sense. Here are one customer's recommendations to manufacturers

WILLIAM RAISGLID



Tools can be handled . . .
. . . much faster if they're organized and labelled plainly. This setup is for a tool crib, and includes hooks for checkout tags

Customers for small tools, gages, and parts deserve more consideration than they usually get. Instead of being able to pick up the materials they want when they want them, users have to mull through an identification scramble that rivals the confusion in a supermarket.

Planning is what's needed, and planning is one thing we haven't got. To be sure; industry has made some big moves toward standardizing tools and gages. And a manufacturer really has a perfect right to package his equipment any way he sees fit—as long as customers buy it. But there's still a long way to go before things get completely straightforward. There's too much time wasted in hunting and finding the right equipment.

Take gage blocks, for instance. The recessed wooden cases they come in do a fine job of protecting the blocks, but they don't do much toward making it easy to locate the blocks. Marks are stamped on the blocks themselves—though often poorly—but the cases are not marked. Why aren't there size numbers stamped into the wood or into metal tags attached close to the recesses?

The same goes for reamer sets and micrometer-caliper sets. If the cases were properly marked, the user wouldn't have to pick up several pieces before he got the one he wanted. He could tell at a glance if any were missing, and which ones. Good identification saves time and trouble all around.

Rotary precision files are another example. Where catalog numbers are marked on the file shanks, they wear off rapidly, even though the files themselves are still in good condition. Identification should also be marked on the toolholder that matches each file.

Tap-extractor sets are even more trouble, what with a holder, collar, sleeve, set of fingers, and spare fingers for each extractor; besides including units for 2-, 3-, and 4-flute taps. Partitions that separate the more than 60 parts in a set should be marked in some way to simplify selection.

Other tool sets that can often stand much better identification are end mills, counterbores, countersinks, thread wire gages, button-die screw plates, pipe dies, socket wrenches, lathe collets, and keyway broaches. Good tool identification, when the tools come in sets and are used in sets, can—

- Keep order and reduce fumbling
- Speed up selection and inventory
- Reduce unnecessary handling
- Reduce losses
- Reduce work errors

Experience proves that it isn't enough to just mark the tools. Each recess or partition should also be identified and matched with the tool that fits it.

FOR INSERTED-CARBIDE TOOLS

Chipbreakers and anvils are essential to many carbide tools, and even when the tools are marked, the breakers and anvils often are not. This is a mistake, because the right tool might be set up with the wrong breaker, or the wrong breaker might be ordered for replacement. In this case, a catalog number might be the best thing to apply.

Carbide bits themselves are not always identified, especially the triangular types. But it wouldn't be too much of a job to identify each bit, at least as to general type, by painting one surface with color:

Red for tungsten catrbide
Gray for HSS

Tool-Identification . . .

Capscrews . . .
. . . and not one label the same as any other—or even close. Note that some even leave off important data — like number of threads per in.

Suggested standard label . . .
. . . includes illustration, name, quantity in the box, dia, tpi, length, and even the name of the manufacturer

Blue for Stellite
Yellow for Tantung

The savings in eliminating confusion are obvious.

Carbide blanks and tips are often marked with acid, which makes a weak and easily worn-off identification—or sometimes not marked at all. If the original carton for the bits is lost, or the user loses track of which bit is which grade, there's no telling what kind of carbide you have. Paint should work here, too, as a ready identification. One edge or surface could be coated with one of seven or eight colors, which would cover the main grades that can be considered standard.

If all tool makers used the same code, the user could identify a random bit no matter who produced it. Thus, bits marked VC-1, 44A, or 2A68 could all be known to be tools for roughing cast iron; whereas with only numbers, you have to be familiar with catalog numbers of all three manufacturers, only one of which is following the carbide-industry classification.

Special boring and reaming tools also cause trouble once in a while because of poor identification. Stamped marks or electric-pencil numerals don't always last as long as the tools themselves. Although you can tell in a general way what the tool is intended for by its appearance, you can't always tell apart two practically identical tools, one meant for roughing, and one for finishing. Here is a suggestion—use a long-lasting stamped mark to show R-1 ¼" for a roughing tool, and F-1 ¼" for the finishing tool.

Offhand, not everyone who uses or handles carbides could be expected to know that grade 78-B is for cutting steel, 883 is for aluminum; or that BL-6, BR-6, D-5, and so on mean the style or shape of the tool. Perhaps consistency throughout the industry is too much to hope for right now; but one simple aid would be an illustration of the tool on the package or box. Then, at least, the user could identify general types on sight. A small illustration of the tool could be added to the label, where the manufacturer already puts quantity, catalog number, size, and grade.

And toolholders: Not all, but some are marked on sides where damage and abrasion can easily remove the numbers. The manufacturer might well pick a surface that will not be abraded for his identification.

One other kind of tool needs better identification. Combination drill-and-countersinks can be identified by these figures:

Size 5, no. 998, body dia 7/16, drill dia 3/16

E-1

⅝. M-1, and another obscure number

1498, D-1, size #3

All these are for different makes. How much simpler and more sensible if all were the same, showing 7/16-3/16 on each tool, with fuller information on the carton.

A BELT AT BELTS

Tools aren't the only shop materials that could stand a new deal for identification. V-belts aren't

too bad; at least the manufacturers have agreed on a system of standard markings. But there has been a change from an old system:

#1—⅜ in. wide
#2—½ in.
#3—⅝ in.

where #2300 indicates a belt ½ in. wide and 30 in. long, to a new system:

#1 is now 3L
#2 is now 4L
#3 is now 5L

where the number indicates the quantity of eighths in the belt width, and old number 2300 is now 4L-230. Some manufacturers use both systems, plus their own special markings, and things get complicated at times. All this could be simplified by using only the standard marking, and making sure it is permanent and located on a nonwearing surface. To make sure it sticks, a stamped indentation could be filled with bright paint.

FASTENERS, TOO

Inconsistent labels on boxes of screws, bolts, nuts, and washers cause confusion all out of proportion to the time that should be spent on picking out the right fastener. Labels show all kinds of information, but in some cases they actually leave off important data—such as the number of threads per inch. This is at least more important than NC or NF.

What you really need on a screw or bolt label is this:

Type of screw
Diameter
Length
Threads per inch
An illustration

This last element is quite important. It allows quick recognition; after all, how much time should you spend in picking out a bolt or screw?

From the illustrations above, it can be seen that various manufacturers call their products by different names, which adds to the confusion. Thus, socket cap screws can be simply cap screws, hexagon cap screws are also machine bolts or bright cap screws, and hex-socket setscrews are also hollow set screws. Round-head machine screws are the same as oven-head screws, truss-head screws, and stove bolts.

Socket-head capscrews . . .
. . . some information is printed, some rubber stamped, and some filled in with ink—which may not have been on the package as originally received

This is really a matter for the industry as a whole, which should standardize its terminology. It matters less which names are actually picked than the fact that all makers should stick to the same standard name.

Color coding is an idea that might work out well here. Two colors could be applied to the boxes; one background color, and one trim color. Thus, for example, hex-head capscrews could be packaged in blue on white, and socket-head capscrews could be in red and white—and so on. This would allow grouping all similar fasteners by size, and depending on the color code to tell you the style.

What the above boils down to is this idea: Why not make the container, as well as the tool or fastener itself, work for the customer?

Suggested standard label . . .
. . . for socket-head capscrews may not be as distinctive as the others, but it delivers the real essentials. Note angled illustration, which shows socket

14 steps TO DESIGN A DIE

STEP 9

How to design automatic stops

J R PAQUIN

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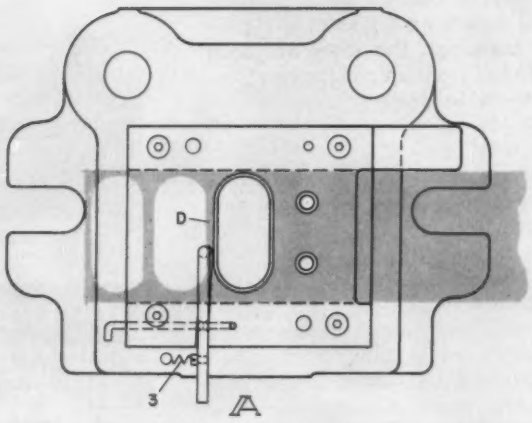
Automatic stops, or trigger stops as they are sometimes called, register the strip at the final die station. They differ from finger stops in that they stop the strip automatically, the operator simply keeping the strip pushed against the stop in its travel through the die. For this reason they are always used when an operator is to feed the strip by hand. Automatic stops can be made of cold-rolled steel or machine steel, cyanide hardened, but when long runs are anticipated they should be made of tool steel, hardened after machining. Design considerations include:

1. Fast, positive action under high-speed, high-shock conditions.

2. Minimum machining of stripper plate for strength.

3. Sturdy, "gadget-free" design. Automatic stops perform grueling service in operation, and weak design can be an endless source of trouble.

Illustrated are seventeen standardized automatic stops with dimensions tabulated to aid the designer in selecting the right one for the conditions encountered. In addition, general rules are outlined to help in the correct application of these die components. This article further explains Step 9 in the 6-page insert—"14 Steps to Design a Die" (*AM*—Oct. 10 '55 p129).



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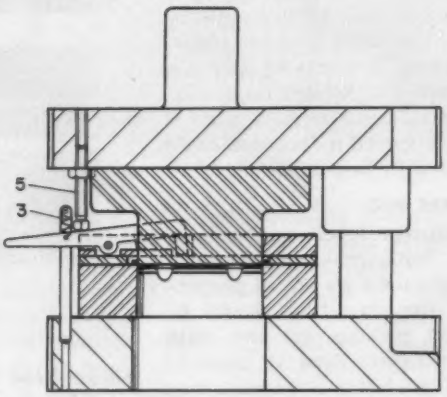

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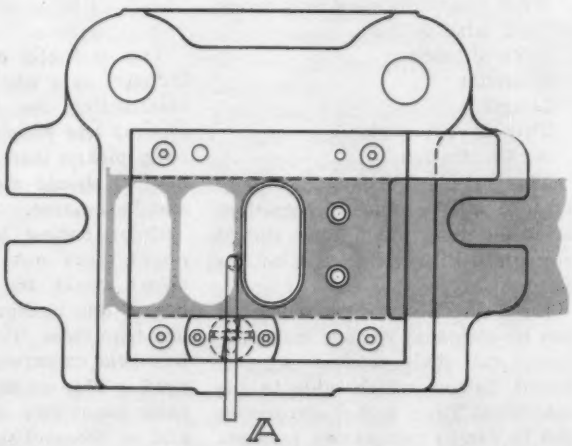

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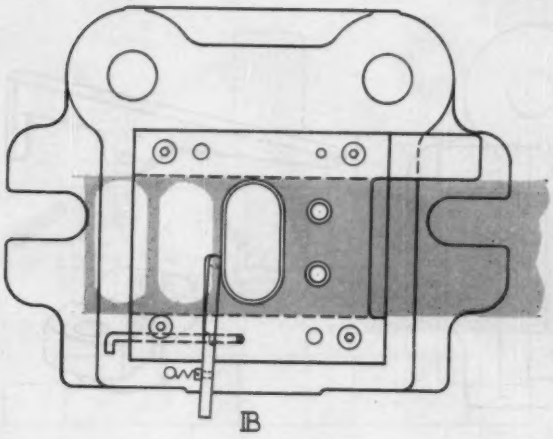
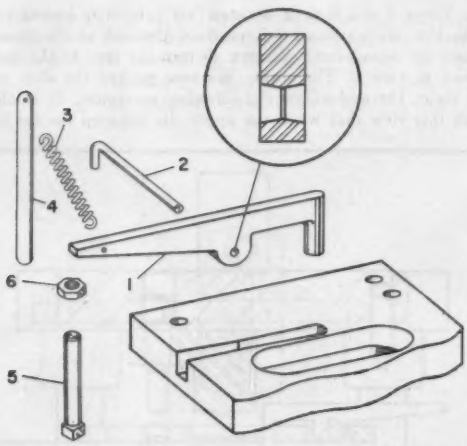
2 . . STOP HOLDER . . .

A better method of applying a side-acting automatic stop is to confine the stop in a holder. Here are the reasons:

1. The holder can be easily hardened for long life.
2. Very little machining of the stripper plate is required.
3. Construction: The stop is a self-contained unit, and it can be quickly removed and used on several dies.





1 . . SIDE-ACTING STOP . . .

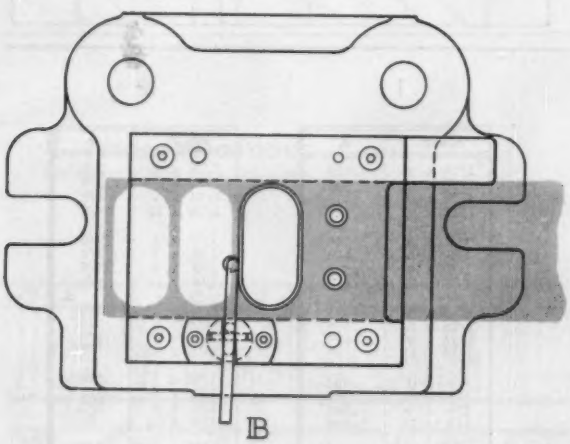
Taken together, two plan views *A* and *B*, with a common side section-view *C*, illustrate the operation of a conventional side-acting automatic stop. At *A* the strip has been advanced toward the left. Previously blanked strip edge *D* contacts the toe of the automatic stop, moving it to its extreme left position as shown, "setting" the stop. Descent of the ram causes the square-head setscrew *5* to raise the stop toe to the position shown in section view *C*. Now, the strip spring *3*, acting at an upward angle, turns the stop to the position shown in view *B*. When the press ram goes up the toe of the stop falls on top of the scrap bridge, allowing the strip to slide under it. After the scrap bridge has completely passed under it the toe drops to the top surface of the die block, acted upon by spring *3*. Now the stop is ready to be reset upon contact of the next blanked strip edge.

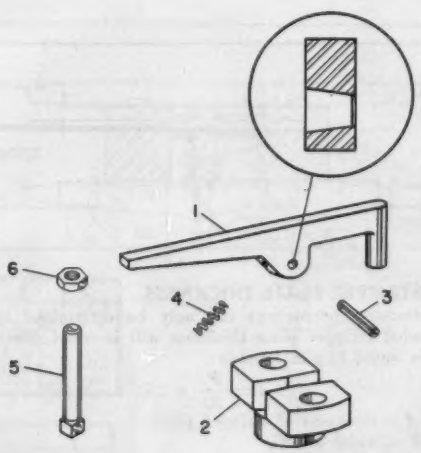
These motions occur at extremely high speeds. On fast runs the motions cannot be followed by eye.

Six parts make up the stop assembly. They are:

1. Automatic stop
2. Fulcrum pin
3. Tension spring
4. Spring post
5. Square-head setscrew, usually ¼ in. dia
6. Jam nut

The hole for the fulcrum pin is taper reamed from both sides to allow rocking. The slot is not machined entirely through the stripper plate except opposite the fulcrum-hole portion for strength



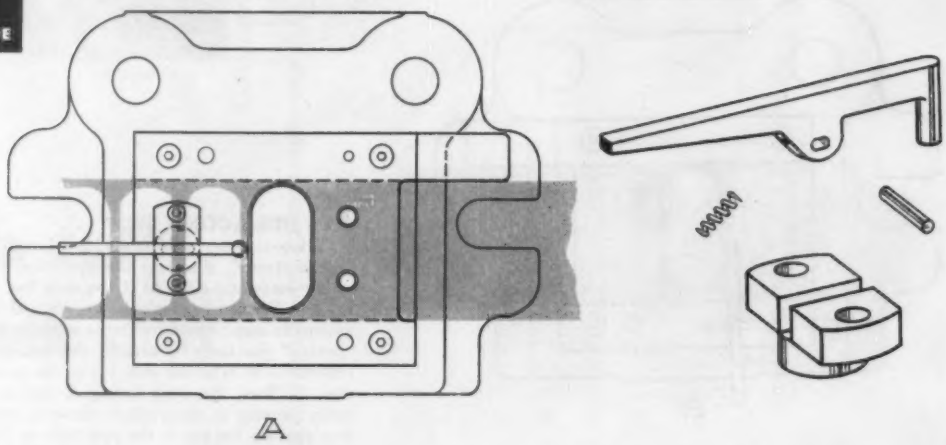


4. There are no "gadgety" posts and exposed springs, but husky parts and simple, clean lines.

View *A* shows the automatic stop "set" and ready for blanking the hole. At view *B* the press ram has descended, releasing the stop and causing it to swing above the scrap bridge. The pictorial view shows stop construction. Stop 1 fits in a tapered slot in holder 2, held by fulcrum pin 3. Compression spring 4 provides the required movement. As in Fig 1, a square-head setscrew 5, locked by jam nut 6, is applied to the punch holder for operating the stop. In this case the fulcrum-pin hole is taper reamed from one side only to allow the spring to provide side thrust, as well as up and down movement

14 steps TO DESIGN A DIE

How to design automatic stops . . .



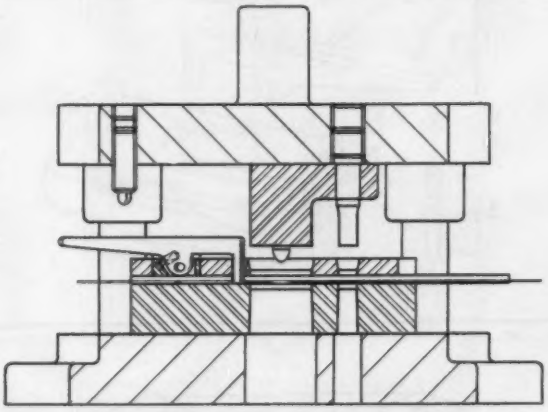
A

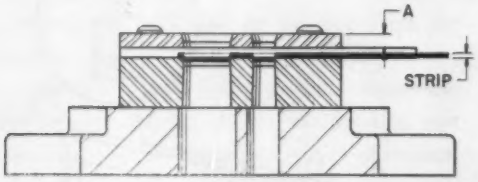
3 . . END-ACTING STOP . . .

A stop in the described holder can be applied as an end-acting automatic stop. End-acting automatic stops are easier to standardize, because they don't have the great range of lengths required in side-acting stops. The main modification needed is an end-milled slot in place of a tapered hole to engage the fulcrum pin. Views *A* and *B* show the stop "set", the strip having pushed it back to its maximum left position. Descent of the press ram causes the square-head setscrew to turn the stop to the position shown at view *C*. The spring has now pushed the stop toward the right, the end-milled slot allowing movement. It is obvious from this view that when the upper die goes up the toe of the

4 . . SPRING PLUNGER . . .

Using a square-head setscrew to actuate automatic stops is a time-honored practice that usually works well. One disadvantage is that the setscrew must be backed up every time the die is sharpened by the amount removed from punch and die members. A great many automatic stops have been smashed by the setscrew through failure to retract it sufficiently after die sharpening. A spring plunger available from Vlier Engineering Co will effectively actuate the stop without adjustment, despite repeated regrindings. The plunger has been backed up by a socket lockscrew, although a jam nut would be equally effective. The heavy series of these standard components should be used to assure positive action





5 . . STRIPPER PLATE THICKNESS . . .

Automatic-stop proportions can only be determined after we know what stripper plate thickness will be used. The correct value is found by the formula:

$$A = \frac{W}{30} + 2S$$

where A = thickness of stripper plate
W = width of strip
S = strip thickness

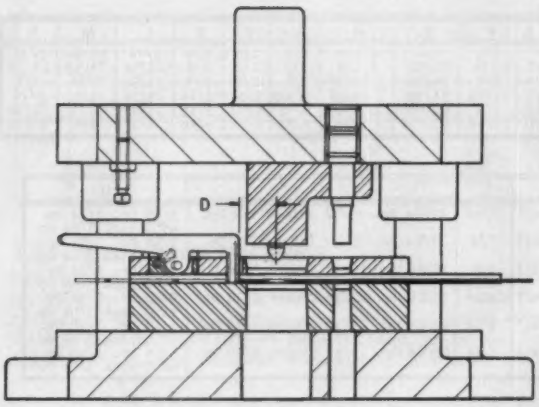
Shown in Table 1 are stripper-plate thicknesses A for representative strip sizes. Table 2 gives recommended commercially available plate sizes and it corresponds, for practical purposes, with Table 1. Example: if strip ⅛ x 5-in. is to be run, select the ⅛ x 6-in. size listed in the table and use a ½-in. stripper plate thickness. For 3/32 x 4 in.-strip use the value given for ⅛ x 3-in. strip given in the table, and a ⅜-in. stripper plate thickness can be used safely. When in doubt as to the correct corresponding size, use the next thicker plate

1

STRIP	A
I/I6 x 3	.225
I/I6 x 6	.325
I/I6 x 9	.425
I/I6 x I2	.525
I/8 x 3	.350
I/8 x 6	.450
I/8 x 9	.550
I/8 x I2	.650
3/I6 x 3	.475
3/I6 x 6	.575
3/I6 x 9	.675
3/I6 x I2	.775
I/4 x 3	.600
I/4 x 6	.700
I/4 x 9	.800
I/4 x I2	.900
5/I6 x 3	.725
5/I6 x 6	.825
5/I6 x 9	.925
5/I6 x I2	I.025

2

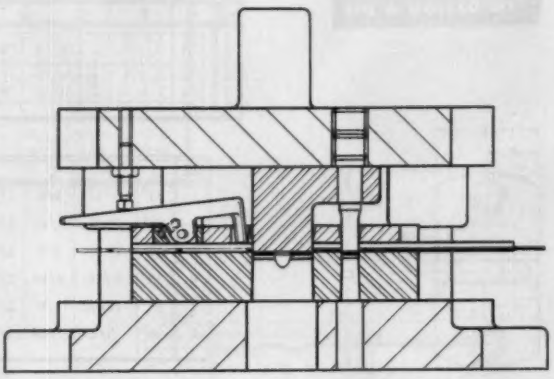
STRIP	A
I/I6 x 3	I/4
I/I6 x 6	3/8
I/I6 x 9	I/2
I/I6 x I2	5/8
I/8 x 3	3/8
I/8 x 6	I/2
I/8 x 9	5/8
I/8 x I2	3/4
3/I6 x 3	I/2
3/I6 x 6	5/8
3/I6 x 9	3/4
3/I6 x I2	7/8
I/4 x 3	5/8
I/4 x 6	3/4
I/4 x 9	7/8
I/4 x I2	I
5/I6 x 3	3/4
5/I6 x 6	7/8
5/I6 x 9	I
5/I6 x I2	I I/8



B

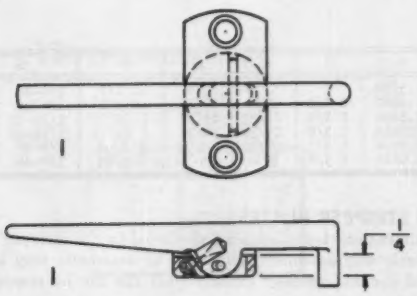
stop will drop on top of the scrap bridge, allowing strip movement toward the left until the toe is again engaged by the strip. Dimension *D* is the sum of the following:

½ feed
½ scrap bridge allowance
0.010 in.



C

This allowance stops the strip 0.010 past its required position. Pilots, engaging in previously pierced holes, bring the strip back this amount for final accurate location before blanking occurs. View *A* is a plan view of the die, while views *B* and *C* are section views showing operation of the stop



6 . . STANDARDIZED STOPS AND HOLDERS . . .

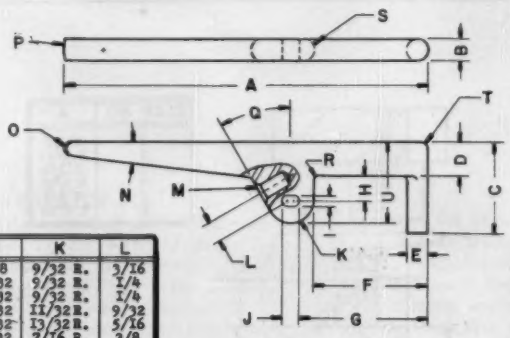
Dimensions for six sizes of automatic stops and holders have been worked out in relation to corresponding thicknesses of stripper plates:

Stop No. or Holder No.	Stripper Plate Thickness, In.
1	¼
2	⅜
3	½
4	⅝
5	¾
6	⅞

The illustrations show a No. 1 stop and a No. 1 holder, the larger sizes being made in proportion

7 . . STOP PROPORTIONS . . .

Necessary dimensions are given for stops Nos 1 to 6.

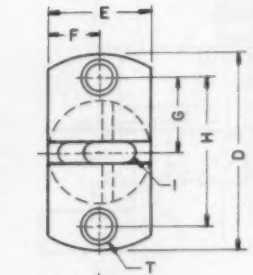


NO.	A	B	C	D	E	F	G	H	I	J	K	L
1	4	1/4	25/32	11/32	1/4	1 3/16	1 3/8	3/16	3/32	1/8	9/32 R.	3/16
2	4 3/16	1/4	15/16	3/8	1/4	1 1/4	1 7/16	1/4	1/8	5/32	9/32 R.	1/4
3	4 3/8	1/4	1 3/32	13/32	1/4	1 3/8	1 9/16	5/16	1/8	5/32	9/32 R.	1/4
4	4 9/16	5/16	1 1/4	7/16	5/16	1 15/32	1 11/16	3/8	3/16	7/32	11/32 R.	9/32
5	4 13/16	5/16	1 15/32	15/32	5/16	1 17/32	1 13/16	7/16	3/16	7/32	13/32 R.	5/16
6	5	5/16	1 11/16	1/2	5/16	1 5/8	1 15/16	1/2	3/16	7/32	7/16 R.	3/8

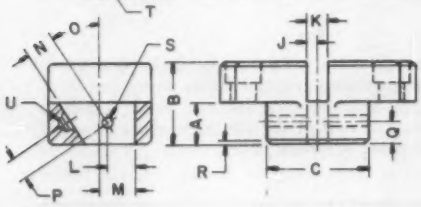
NO.	M	N	O	P	Q	R	S	T	U
1	3/16 Dr. 3/8 Dp. 45 C/sink 1/16 Dp.	6°	1/16 R.	1/2 R.	30°	3/64 R.	1/8 R.	1/16 R.	21/32
2	3/16 Dr. 3/8 Dp. 45 C/sink 1/16 Dp.	6°	5/64 R.	1/2 R.	30°	3/64 R.	1/8 R.	5/64 R.	13/16
3	3/16 Dr. 3/8 Dp. 45 C/sink 1/16 Dp.	6 1/2°	5/64 R.	1/2 R.	30°	3/64 R.	1/8 R.	3/32 R.	31/32
4	3/16 Dr. 3/8 Dp. 45 C/sink 1/16 Dp.	6 1/2°	3/32 R.	1/2 R.	30°	3/64 R.	5/32 R.	7/64 R.	1 1/8
5	3/16 Dr. 3/8 Dp. 45 C/sink 1/16 Dp.	7°	3/32 R.	1/2 R.	30°	3/64 R.	5/32 R.	1/8 R.	1 9/32
6	3/16 Dr. 3/8 Dp.	7 1/2°	3/32 R.	1/2 R.	30°	3/64 R.	5/32 R.	5/32 R.	1 7/16

How to design automatic stops . . .

NO.	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	1/4	21/32	1	2	1	1/2	3/4	1 1/2	1/8	1/8	1/4	5/16	23/64	5/16
2	3/8	13/16	1 1/8	2 1/8	1 1/8	9/16	15/16	1 5/8	1/8	1/8	1/4	11/32	13/32	11/32
3	1/2	31/32	1 1/4	2 3/8	1 1/4	5/8	29/32	1 13/16	1/8	1/8	1/4	11/32	7/16	3/8
4	5/8	1 1/8	1 3/8	2 1/2	1 3/8	11/16	31/32	1 15/16	5/32	5/32	5/16	13/32	1/2	7/16
5	3/4	1 9/32	1 1/2	2 7/8	1 1/2	3/4	1 3/32	2 3/16	5/32	5/32	5/16	15/32	9/16	15/32
6	7/8	1 7/16	1 5/8	3	1 5/8	13/16	1 5/32	2 5/16	5/32	5/32	5/16	1/2	5/8	17/32

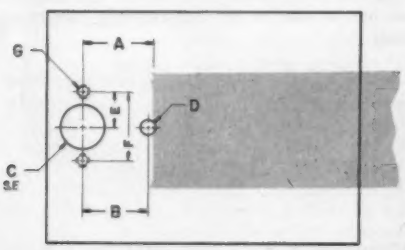


NO.	O	P	Q	R	S	T	U
1	33°	7/32	1/8	1/32 x 45°	3/32	17/64 Dr.- 13/32 C'bore 1/4 Dp.	3/16 Dr. 3/32 Dp. 45° C'sink 3/64 Dp.
2	33°	17/64	3/16	1/32 x 45°	1/8	17/64 Dr.- 13/32 C'bore 1/4 Dp.	3/16 Dr. 3/32 Dp. 45° C'sink 3/64 Dp.
3	33°	17/64	1/4	1/32 x 45°	1/8	21/64 Dr.- 15/32 C'bore 5/16 Dp.	3/16 Dr. 3/32 Dp. 45° C'sink 3/64 Dp.
4	33°	5/16	5/16	1/32 x 45°	3/16	21/64 Dr.- 15/32 C'bore 5/16 Dp.	3/16 Dr. 3/32 Dp. 45° C'sink 3/64 Dp.
5	33°	11/32	3/8	1/32 x 45°	3/16	25/64 Dr.- 19/32 C'bore 9/16 Dp.	3/16 Dr. 3/32 Dp. 45° C'sink 3/64 Dp.
6	33°	3/8	7/16	1/32 x 45°	3/16	25/64 Dr.- 19/32 C'bore 9/16 Dp.	3/16 Dr. 3/32 Dp. 45° C'sink 3/64 Dp.



8 . . HOLDER DIMENSIONS . . .

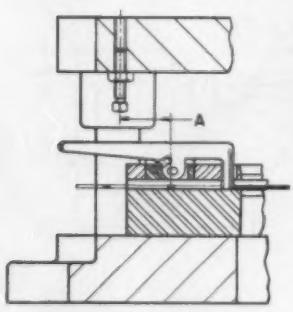
All necessary dimensions are supplied for holders to be used with stops Nos 1 to 6.



NO.	A	B	C	D	E	F	G
1	1.4687	1.3750	1	5/16	3/4	1 1/2	1/4-20 Tap
2	1.5625	1.4687	1 1/8	5/16	15/16	1 5/8	1/4-20 Tap
3	1.7187	1.6406	1 1/4	11/32	29/32	1 13/16	5/16-18 Tap
4	1.8750	1.7656	1 3/8	13/32	31/32	1 15/16	5/16-18 Tap
5	2.0000	1.8906	1 1/2	13/32	1 3/32	2 3/16	3/8-16 Tap
6	2.1562	2.0625	1 5/8	7/16	1 5/32	2 5/16	3/8-16 Tap

9 . . HOLES IN STRIPPER PLATES . . .

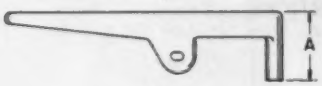
This table gives dimensions for machining the holes in the stripper plate to receive the automatic stop assembly. This type of automatic stop is a self-contained unit and can be removed quickly from the die by removing two screws.



STOP NO.	A
1	1 1/8
2	1 3/16
3	1 1/4
4	1 5/16
5	1 3/8
6	1 7/16

10 . . SETSCREW LOCATION . . .

Tabulated are dimensions *A* between automatic stop and actuating square-head setscrew. By standardizing the position of the actuating screw, more uniform results are assured.



STOP NO.	A
1	25/32
2	15/16
2-A	1
3	1 3/32
3-A	1 5/32
3-B	1 7/32
4	1 1/4
4-A	1 5/16
4-B	1 3/8
4-C	1 7/16
5	1 15/32
5-A	1 17/32
5-B	1 19/32
5-C	1 21/32
6	1 11/16
6-A	1 3/4
6-B	1 13/16

11 . . TOE LENGTHS . . .

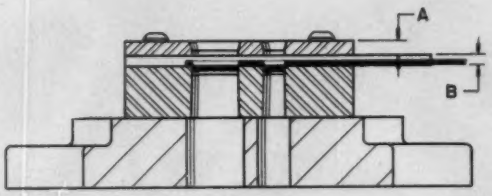
Toe lengths *A* are given for all stops incorporating the variations described in Fig 12. We now have 17 standardized automatic stops, many of which vary only in respect to dimension *A*

STRIPPER PLATE THICKNESS A											
1/4		3/8		1/2		5/8		3/4		7/8	
B	NO.	B	NO.	B	NO.	B	NO.	B	NO.	B	NO.
1/8	1	1/8 3/16	2 2-A	1/8 3/16 1/4	3 3-A 3-B	1/8 3/16 1/4 5/16	4 4-A 4-B 4-C	3/16 1/4 5/16 3/8	5 5-A 5-B 5-C	1/4 5/16 3/8	6 6-A 6-B

12.. BACK-GAGE THICKNESS . . .

Still another factor must be taken into consideration when specifying toe length *C* in Fig 7 and *A* in Fig 11. This is the thickness *B* of the back gage and front spacer, because in table No. 2 of Fig 5 the same stripper plate thickness can be used for more than one strip thickness. For example, a stripper plate ⅜ in. thick is used for 1/6 x 6-in. strip. But, it is also used for ⅛ x 3-in. strip, which would require a thicker back gage and front spacer, raising the stop.

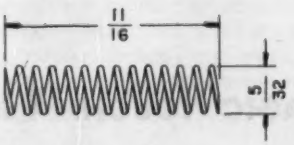
In the above table further automatic stop numbers are applied to allow for these variations. For example, a stripper plate thickness ½ in. can have a spacer thickness *B* of ⅛ in., which calls for stop No. 3. It may also have a spacer thickness of 3/16 in., in which case stop No. 3-A would be used. Still another spacer thickness is ¼ in. where stop No. 3-B would be used.



13.. FULCRUM PINS . . .

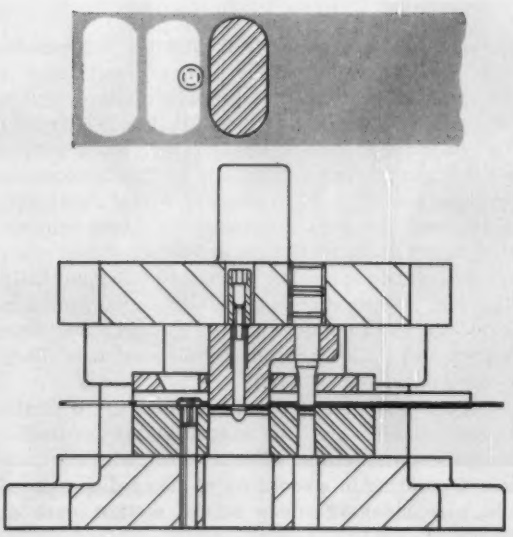
Lengths *A* and diameters *B* of fulcrum pins are:

STOP NO.	A	B
1	7/8	3/32
2	1	1/8
3	1 1/8	1/8
4	1 1/4	3/16
5	1 3/8	3/16
6	1 1/2	3/16



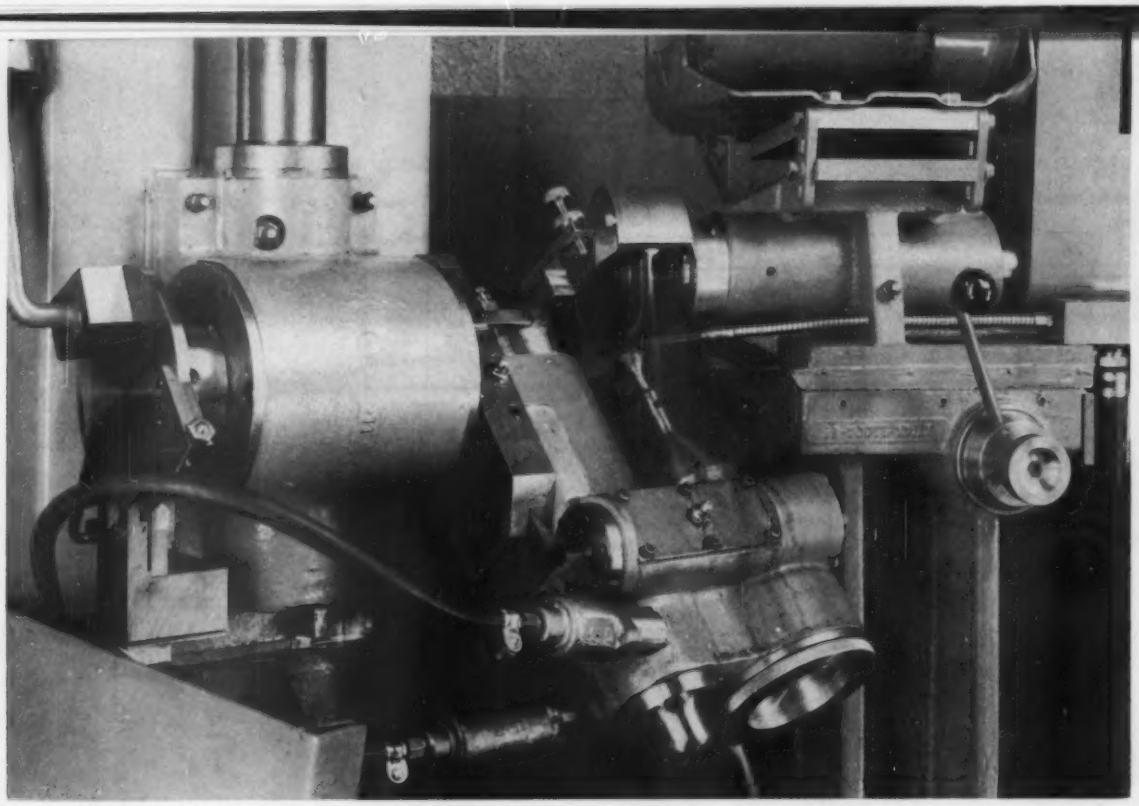
14.. SPRING DIMENSIONS . . .

All stops use the same size spring, but pressure can be varied by using different wire diameters



15.. PIN STOP . . .

Trigger-type automatic stops previously described are used for all but very wide blanks. Wide blanks, run in slow presses, can be located by a simple pin stop pressed into the die block. In operation the strip clings around the blanking punch and is removed from it upon contact with the underside of the stripper plate. The operator applies pressure against the strip tending to move it toward the left so that, as it is released, it falls with the scrap bridge on top of the pin stop to allow feeding. A sight hole should always be applied to the stripper plate so that the operator can see stop action



Fully automatic bur grinder . . .
provides three-dimensional cycle of motions to produce solid carbide burs without any manual help except loading and unloading—and even the latter may soon be avoided. Burs come out sharper, cleaner, and more accurate

THE MAGIC TOUCH: Cam-hydraulic system grinds burs automatically

For years experts have said it couldn't be done—those complex, contoured, close-toothed burs could only be ground manually, and by a skilled operator. Now, by combining cams and hydraulics into an ingenious three-dimensional grinder, The Atrax Company, Newington, Conn, is doing it. Savings and quality are startling.

WILLIAM M STOCKER, JR,
associate editor

Before World War II almost all of the burs used in the United States were imported. When the war came along, American Metalworking was faced with a serious shortage. Almost anybody with a grinder in his cellar or garage could get a contract to regrind worn burs—and quickly be deluged with barrelfuls.

Very quickly companies were formed to make new burs as well as regrind the worn tools. Today millions of burs are used, both carbide and high-speed steel, and the situation has reversed. Practically all of them are produced in the US.

However, one problem still faces the bur manufacturers: Much of the work must still be done by skilled people using a freehand technique. It takes months to train a good burmaker and weeks to find out whether a trainee has the skill for the job. And even for a top-notch burmaker, freehand grinding is a slow and painstaking operation.

One method of minimizing this problem is the development of machinery, frequently homemade, which has a semi-automatic action—hand fed but with cams to provide the complex motions and a device for indexing. Going in this direction, the ultimate is a truly automatic bur grinder. Many people have thought it next to impossible. The kinematics in designing such a machine offer a real challenge.

Faced with the need for greatly increased productivity, Atrax accepted the challenge about two years ago. Today this company has six machines, fully automatic, in operation and five more machines in various stages of completion. These machines were designed and built by Atrax for its own use. *They are not for sale.*

Designed and built from the ground up to duplicate manual grinding, the machines are controlled through a combination of cam and hydraulic motions. Operating in a coordinated three-dimensional cycle, plus indexing and a helical motion, each of

these machines is capable of producing an over-all accuracy well within 0.001 in. and flute spacing accurate within 5 minutes of arc.

Using a diamond wheel and water coolant, each flute is completed in one pass. Typical output from the new machine is a ¾-in.-dia, solid-carbide, ball bur containing 40 flutes which is completed in 16 min. This operation requires about four hours of manual grinding. In addition, burs ground on the new machine have cleaner, sharper edges and the surface finish in the flutes is considerably better than the edges and finish on manually ground burs.

Aside from bur quality and speed, one of the major factors in bur cost is the diamond wheel. These machines, because control is so much better, provide greatly increased wheel life. Part of this control setup is an ammeter which shows wheel-motor load. The motor is never allowed to overload. Also, the machine is equipped with an overload safety device so that if the wheel slows the feed slows; if the wheel stops, the feed stops.

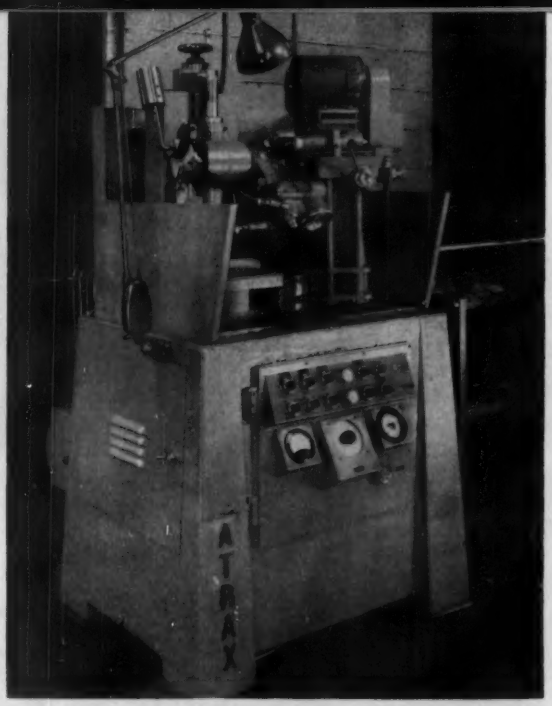
Using a complex indexing device, with which the operator simply sets a dial for any number from 6 to 72 flutes, burs are air indexed automatically. Contrast this with manual operation in which the burmaker must divide the bur blanks into halves, quarters, eighths, etc until the desired number of flutes is marked—by eye.

One of the outstanding advantages of the new equipment is that it provides an "engineered setup." Even the first piece off of the machine was perfect because all of the cams and settings were calculated and mathematically checked in advance. This kind of control avoids the problem of dissimilarity in hand-ground burs because, once the shape and quality of the first piece are okayed, all of the following pieces will be the same. And, by careful storage of the cams, the same bur specifications can be repeated at any time in the future.

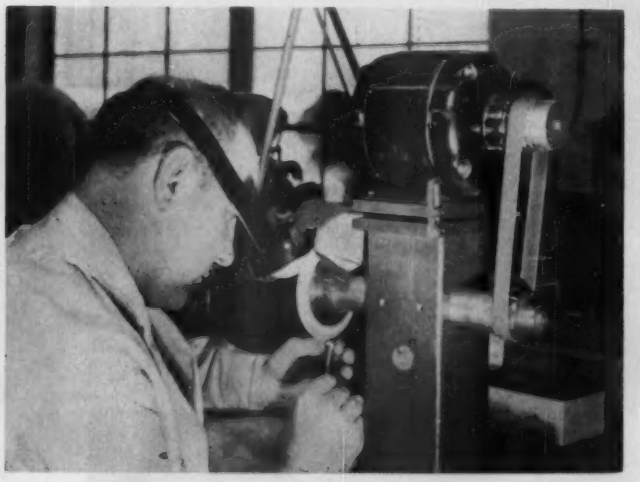
Most difficult of the problems in making this machine work, was development of the cams. Every degree of the 220 actual working degrees on each of the cams was developed to within 0.0001 in. In addition to calculating the cam shape, the milling layout for each cam shape had to be developed. This task required months of study and work. Cams are machined to within a few ten-thousandths of an inch. It is expected that a set of cams will be good for 100,000 burs.

Now that the original work is done, charts are available to aid in developing the cams and about 1½ days are required to machine a set of cams.

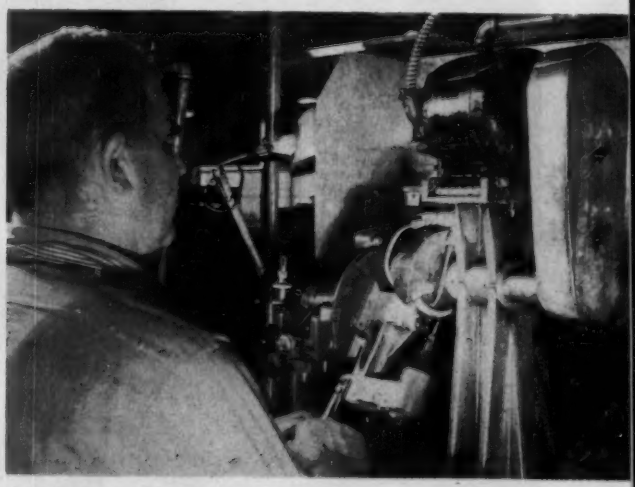
Actually, cams provide the necessary motions through a three-dimensional cycle that includes feed, helix, size, and depth of cut, as well as automatic indexing. If rake or clearance are required, these are determined by the wheel angle.



One of the twelve . . .
automatic bur grinders being built and installed at Atrax plant



Original method . . .
of hand-grinding burs requires great skill; is time consuming



Semi-automatic method . . .
avoids some of skill requirement but still requires time and care

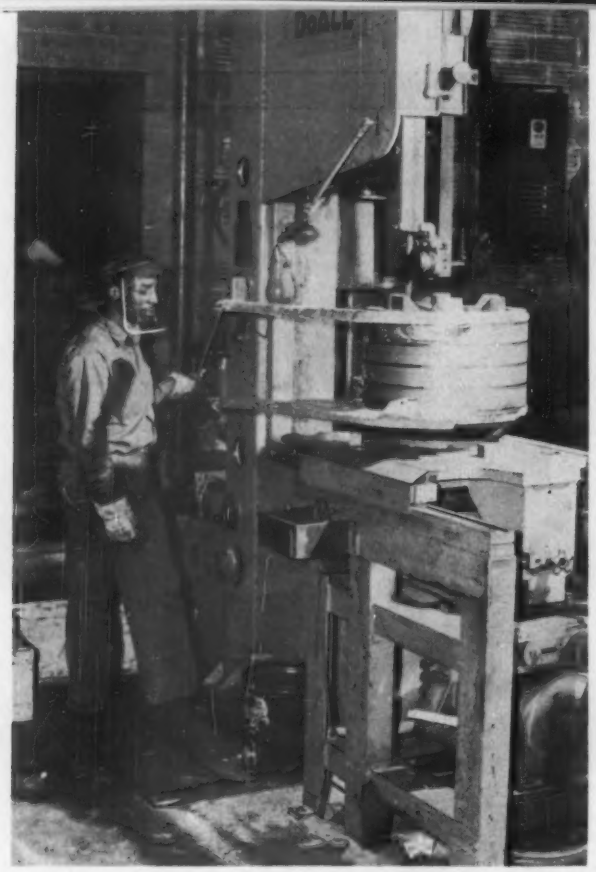


Table fixture slides on ways . . . to position casting next to bandsaw blade. Power is from 18-in.-stroke air cylinder. Fixture plate rotates under power from Reliance gearmotor and V & S Jr electronic variable-speed drive. Machine has special work-height capacity of 40 in.

Permanent-mold casting is not clamped . . . but is simply centered, because weight keeps it in place. Controls at left include reversing switch for gearmotor, in case hard spot is encountered by saw blade. Maximum work size is 31 in. dia x 30 in. thick x 3000 lb

Faster flash trimming with turning bandsaw fixture

JONATHAN L COLLENS, superintendent: Ivanhoe Div, RELIANCE ELECTRIC & ENGINEERING CO, CLEVELAND

Cast aluminum-bronze rotors for special motors and generators are trimmed in less time and at less cost than formerly with a unique powered fixture that works with a DoAll Zephyr 36-in. bandsaw.

The machine does regular work with its normal 30x36-in. table, but this can be removed and the special fixture located in its place. Power brings the rotating plate up to the bandsaw and powered rotation is provided so gates and risers can be removed uniformly.

The bottom band guide of the machine has been elevated with a riser block to a spot just below the revolving fixture table. High-speed insert guides are installed, and the angle on the insert guide block matches the relief on the fixture table.

Total outlay for the new rig was $3000, including only 150 manhours for design time. The fixture paid for itself in under six months of operation.

American Machinist

SPECIAL REPORT NO. 440

ADVANCED TOOLING SPEEDS TIGER PRODUCTION

JOHN P WRIGHT, associate editor GOSTA M WERNBERG, assistant editor

From a recent visit to Grumman Aircraft, home of the supersonic Tiger F11F-1F, we selected a series of outstanding case studies from the company's Manufacturing Engineering Division on their up-to-date developments in machining, tool designing, forming, assembly, honeycomb bonding, and descaling by reverse polarity. We believe that many of the ideas illustrated in these reports can be readily adopted by branches of Metalworking other than aircraft

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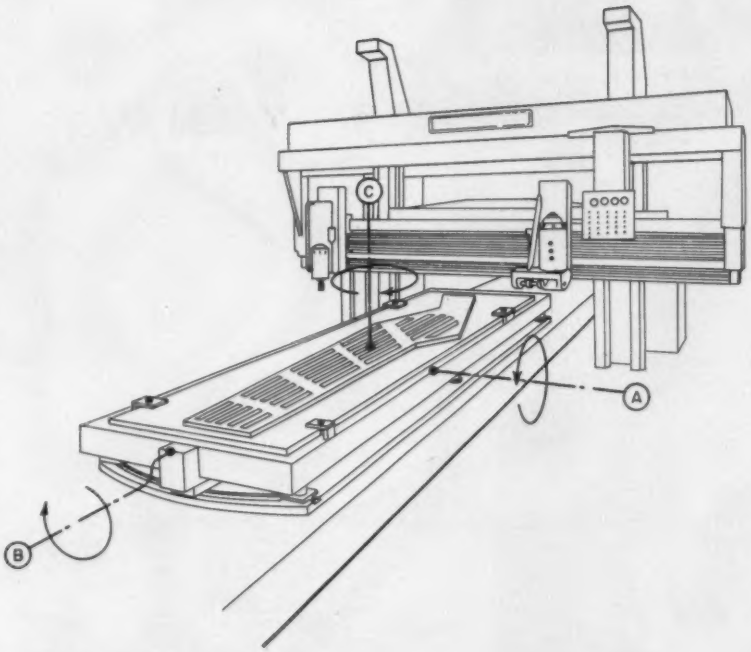
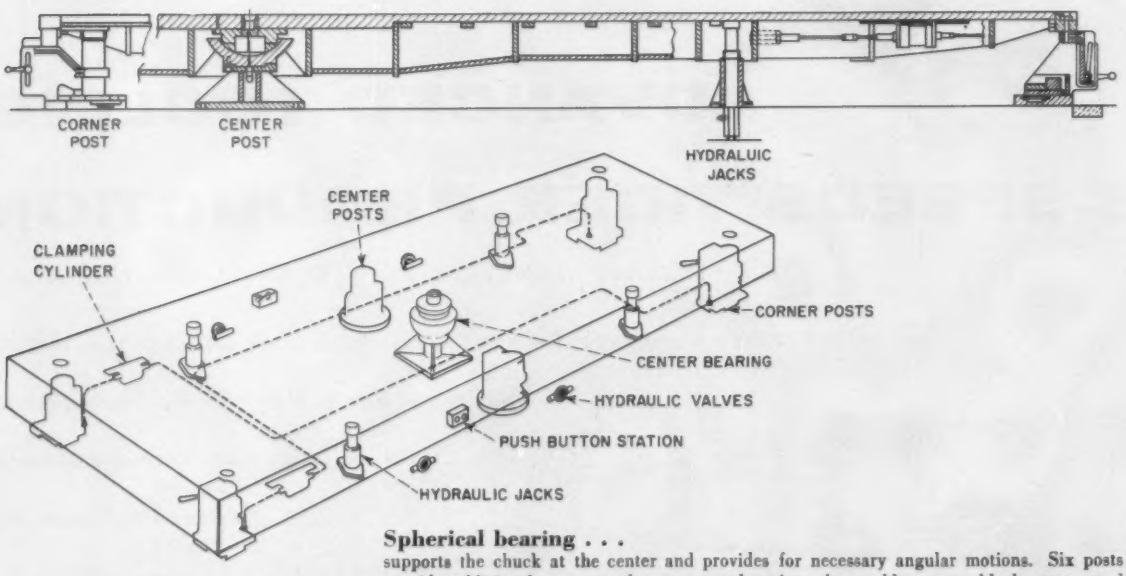
Advanced tooling speeds Tiger production . . .

Sine table . . .

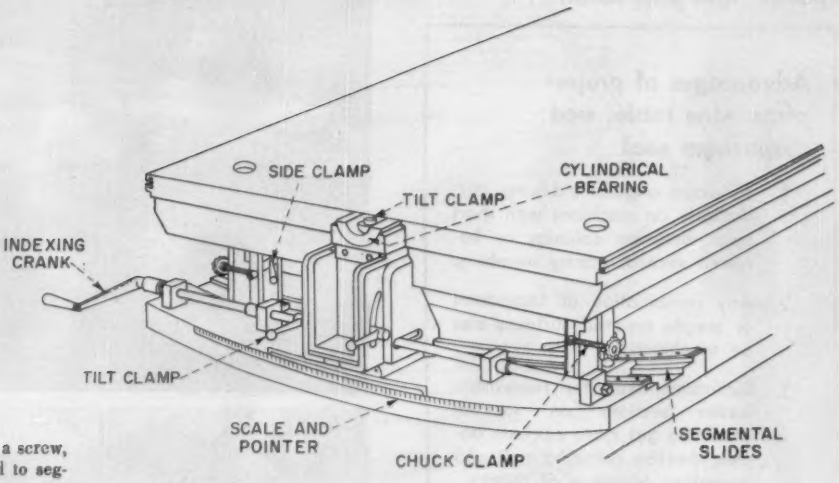
Developed by Grumman engineers permits accurate and rapid machining at compound angles of converging, ribbed wing skins. While it is possible to machine straight-line paths, non-parallel to machine-table motion, by tracing and steering systems, such servo-controlled systems have a slight hunting action which limits finish and accuracy of ribs. Highest feed rates, finish, and accuracy are obtained by placing the cutter path parallel to machine motions. With this thought in mind, the tilting and index chuck (sine table) was designed. Tilt is provided about the transverse (A), longitudinal (B), and vertical (C) axes. The web or skin thickness can also be machined with single or compound tapers. Changes in rib angle or skin-thickness taper can be accomplished without removal of the skin from the chuck because of the single-piece construction. Indexing about axis (*C*) permits use of horizontal slab milling cutters for greater stock removal because the line of cut is coincidental with the line of table travel. Giddings & Lewis assisted Grumman in the refinement of the prototype design, and in turn granted exclusive manufacturing rights to the Falk Corp who are now prepared to build the sine table on special request





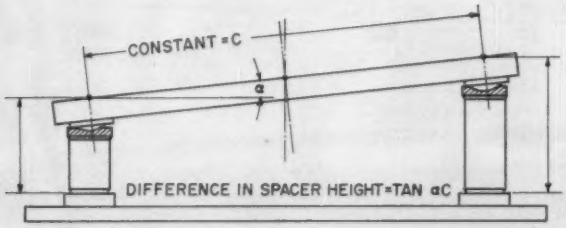
Spherical bearing . . .

supports the chuck at the center and provides for necessary angular motions. Six posts provide additional support, also accommodate interchangeable spacer blocks to control the transverse or longitudinal angles governing skin thickness. Quick changing of spacer blocks is facilitated by a system of hydraulic jacks arranged so that either one side or one end of the chuck can be lifted a sufficient amount to change the spacer. Hydraulic-jack system is controlled through a solenoid valve and pushbutton stations. Air-powered holddown system interlocks with the jacks to provide automatic operation



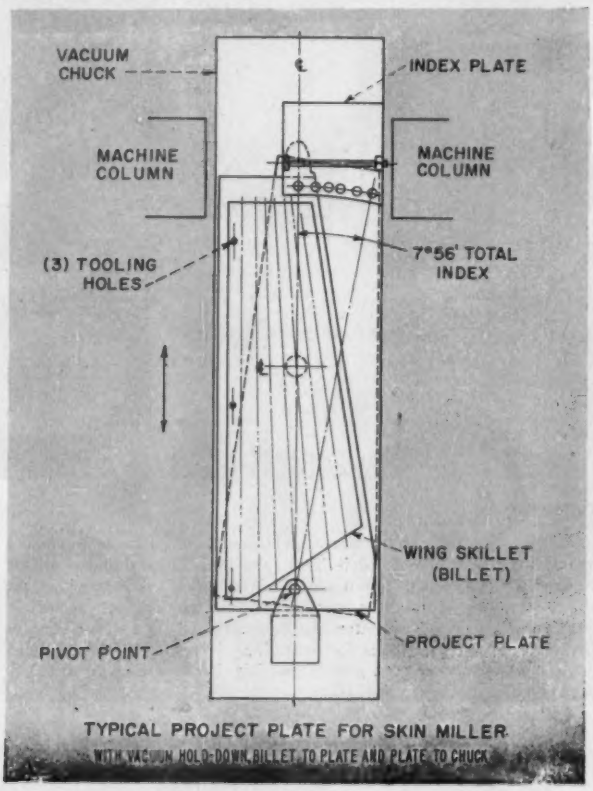
Indexing motion . . .

about axis (*C*) is operated through a screw, nut, and crank mechanism attached to segmental slides supporting the corner posts. Clamping of the chuck to the slide, and clamping of the slides, prevents any possible side motion. Slides are actuated by a bracket extending from, and attached to, end of table



Simple calculation . . .

gives the length of the spacers for a given angle. Spherical seat in the post construction provides post-heights as a direct function of spacer-dimension regardless of chuck angle. Geometry-wise, tilting the chuck positions the skin for taper thickness. Indexing the chuck about its vertical axis positions the skin for converging surfaces generated about this vertical axis. Indexing the project plate provides a means of positioning the skin for converging surfaces generated about an axis which is at all times perpendicular to the tilted surface of the chuck



TYPICAL PROJECT PLATE FOR SKIN MILLER
WITH VACUUM HOLD-DOWN BILLET TO PLATE AND PLATE TO CHUCK

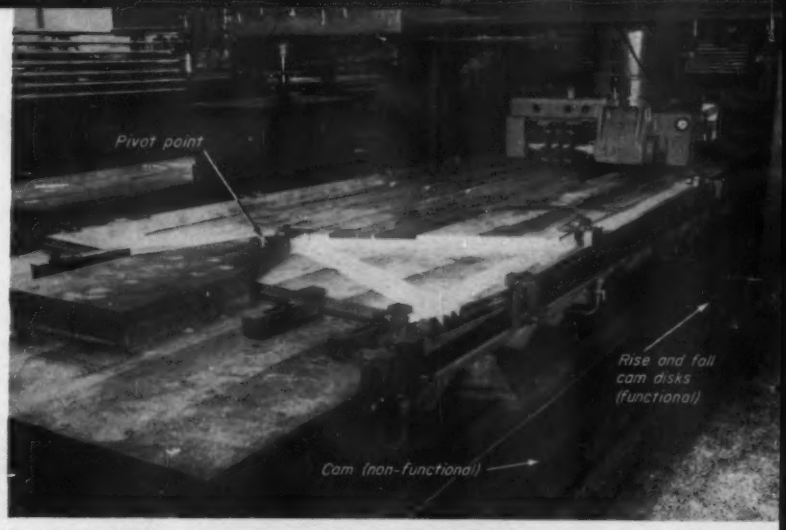
Greater angular indexing range . . .

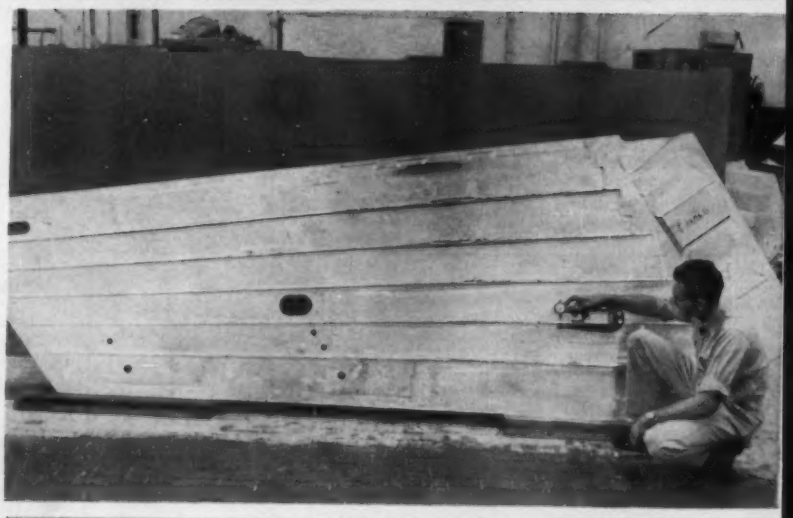
and greater accuracy in machining at higher feed rates, can be obtained by using the combination of the sine table and an angularly indexing project plate. With the project plate, the indexing angle is not limited by the rectangular dimension of the vacuum chuck in relation to the distance between the columns, or the gantry clearance on planer-type machines. It is limited only by the size and contour of the skin because the project plate is only slightly larger than the skin. Vacuum secures both project plate to chuck, and billet to project plate. Indexing the plate is accomplished by a leadscrew that drives a secondary plate attached to the project plate, thereby rotating it about the axis of a pivot point, or reference point, representing the geometrical index point of the wing

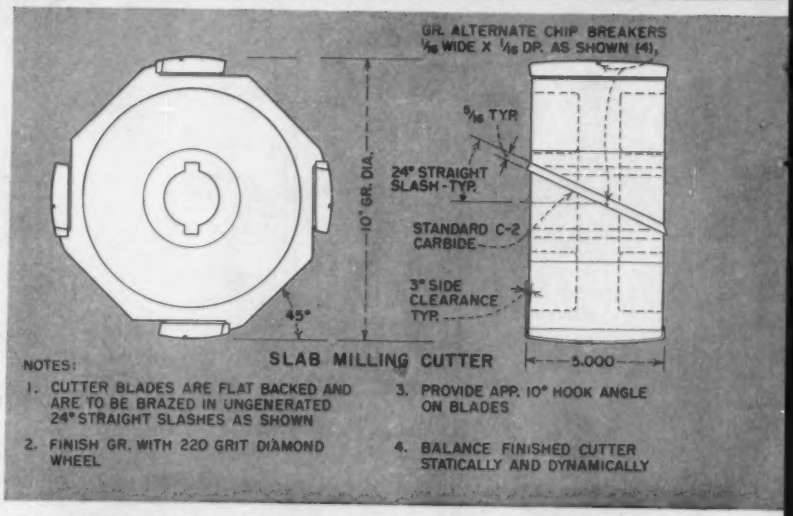
Advanced tooling speeds Tiger production . . .

Advantages of project plate, sine table, and diaphragm seal

1. Increases angular indexing, particularly on machines with short span between columns or between vertical gantry members.
2. Any combination of compound or simple tapered surfaces can be machined.
3. Eliminates need for removable corner sections on vacuum chucks to get more extreme angles, thereby reducing cost and increasing accuracy of chucks.
4. Vacuum seal protected against damage during indexing of project plate
5. Aircraft designer can consider the pivot point on project plate as the reference point for configuration of converging stiffeners and adjacent back tapers of the skin. Position of every cut can be a direct function of angular index through the pivot point, and the lateral distance from this point.
6. Less-expensive, simplified skin miller is required because the "monkey motions" are in the workholder, not in the machine.
7. Errors from backlash or lost motion in tracing mechanisms, or from feedback system, are not absorbed in the machining operation.
8. Higher feeds can be used because full horsepower rating of the spindle can be utilized.
9. Interchangeability of cutter diameters is simplified if airframe designers can standardize on 10-, 12-, and 14-in.-dia cutters for horizontal milling.
10. Interchangeability of cams between skin mills is further simplified when tool engineers adopt a standard diameter follower. Four-inch-diameter followers work well on present Grumman skins because this diameter develops a 7-in.-max and a 3-in.-min height cam. (Additional data under "cam design for interchangeability on rise-and-fall milling" on page 135)



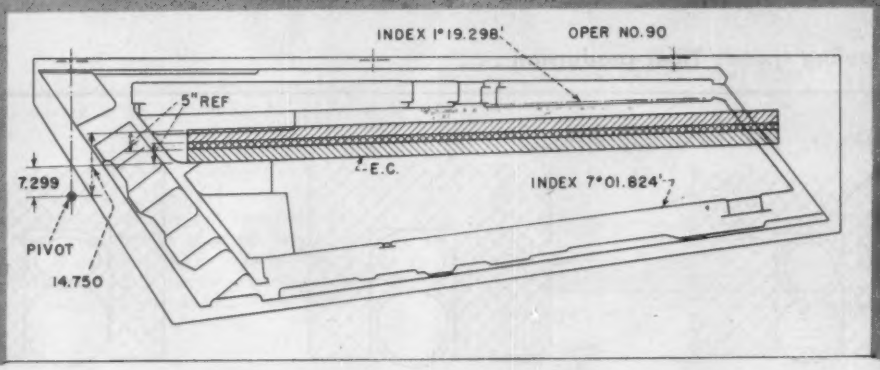


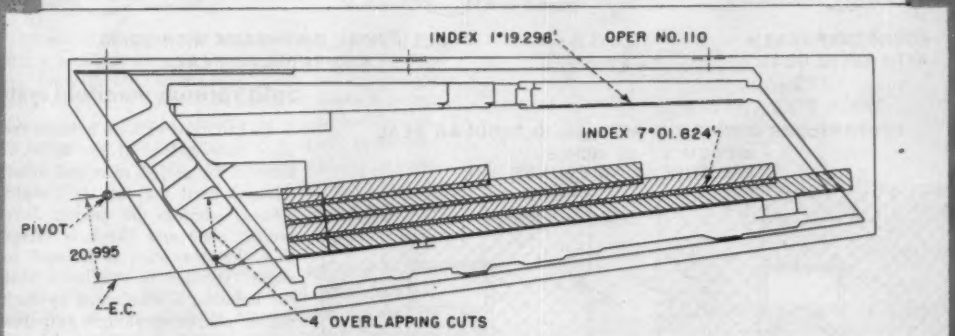

GR. ALTERNATE CHIP BREAKERS 1/16 WIDE X 1/16 DP. AS SHOWN (4),
5/16 TYP.
24° STRAIGHT SLASH - TYP.
STANDARD C-2 CARBIDE
3° SIDE CLEARANCE TYP.
10" GR. DIA.
45°
5.000
SLAB MILLING CUTTER
NOTES:
1. CUTTER BLADES ARE FLAT BACKED AND ARE TO BE BRAZED IN UNGENERATED 24° STRAIGHT SLASHES AS SHOWN
2. FINISH GR. WITH 220 GRIT DIAMOND WHEEL
3. PROVIDE APP. 10° HOOK ANGLE ON BLADES
4. BALANCE FINISHED CUTTER STATICALLY AND DYNAMICALLY

Stock removal . . .

averages 300 cu in. per min. using a 5-in.-wide, 10-in.-dia cutter with molded carbide helical inserts. Cutter speed is 3600 rpm, feed 50 ipm, and depth of plunge cut averaged 1 7/16 in. Aluminum (75ST6) billet has a gross weight of 1150 lb, and is stress-relieved by stretching before machining; net weight is 198 lb. Flywheels mounted on cutter spindle contributed to a better surface finish. Use of segmental cam disks for controlling rise and fall of the horizontal spindle permits heavier cuts, greater tool life, lower cam costs, and provides greater accuracy between breakouts

WITH VACUUM HOLD-DOWN BILLET TO PLATE AND PLATE TO CHUCK





OPER.	DESCRIPTION OF CUT	TABLE POSITION	INDEX POSITION	CAM NO.	CAM SECT'S	CUTTER HEIGHT *
FIN.	"e" SURFACE	TAN 0.001404 (B-B)	7°-01.824'-PARALLEL	#7(P16249)	1 & 4	0.167

INDICATOR READING	CUTTER DISTANCE ** PIVOT ℄ TO EDGE OF CUT	REMARKS
+0.096	20.995	4 CUTS REQ'D

TRACER DIA	4.040

CUTTING SPEED	
FEED IN./M	50

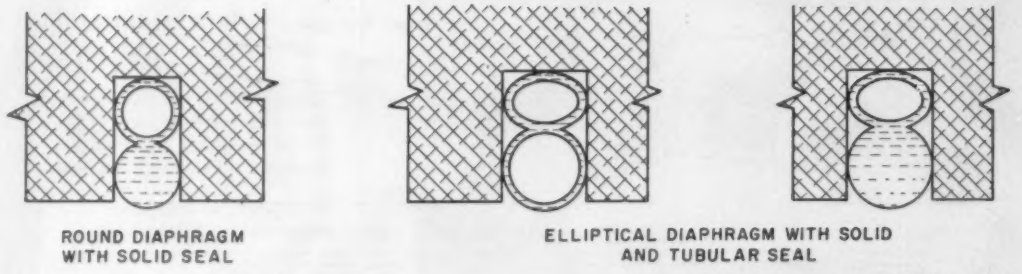
CUTTER	
DIAMETER	10"
WIDTH	$5\frac{1}{8}$
CORNER RAD.	0.187
TYPE	SLAB MILL

* AT 154-155 DIM. ** ADD OR SUBTRACT CUTTER WIDTH AS INDICATED
(ZERO SETTING OF INDICATOR 0.135 ABOVE PROJ. PLATE IN LEVEL POSITION)

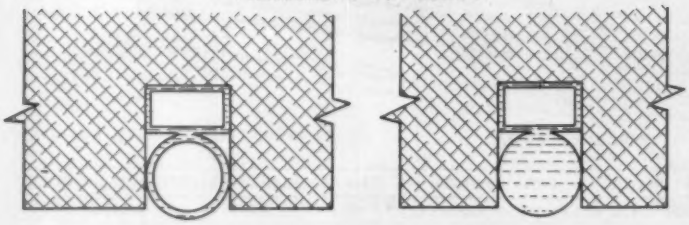
Sequence charts . . .

indicate each individual operation to be performed on the intricate skin requiring 80 over-all operations. Use of these charts cut floor-to-floor time by 30% because the operator no longer has to struggle through time-consuming hours with a complex drawing to decide on each individual machining cut. Neither does he have to select cutters, tooling, calculate sine-table settings, cam settings, drawing dimensions, etc. In short, the sequence charts eliminated the operator's responsibility of interpreting pertinent information from the part drawing

Advanced tooling speeds Tiger production . . .



RECTANGULAR DIAPHRAGM WITH SOLID TUBULAR SEAL
VACUUM: 27-29 INCHES
PRESSURE: 5-10 POUNDS



VARIOUS SECTIONS THAT CAN BE USED
DIAPHRAGM-SEAL

Split vacuum manifold system . . .

is used to draw vacuum beneath the project plate independent of the billet. Vacuum between the project plate and billet is never released until the skin is completely machined; whereas the vacuum between the project plate and chuck is released each time that the plate is indexed to a new angle. Damage to the lower seal during the indexing is eliminated by the use of a double rubber diaphragm seal similar to a figure 8. Top portion of the seal is the diaphragm, and lower portion is the seal. Before the project plate is indexed, a vacuum is drawn in the upper portion of the diaphragm, causing it to collapse and retract the seal inside the groove. After indexing, air pressure inflates the diaphragm

Cam design for interchangeability on rise-and-fall milling

Grumman, after considerable detailed study and actual trial, has devised a method for standardizing cam design for skin milling. Table travel, and rise and fall of the spindle, are coordinated by the longitudinal positions of cams relative to the workpiece. Methods of calculating and designing cams are dependent upon the manner of dimensioning the skin. Figure *1* illustrates a condition where it is desired to provide clearance on the workpiece for subsequent assembly of another detail part. Here the station occurs at tangent point of cutter radius (R), permitting the cutter exit point to vary within specified limits.

Figure *2* shows the opposite case where the exit point is held constant and the tangent point is allowed to vary within specified limits. Cam geometry shown in Fig. *3* may be used on workpieces where the radius tangent point is held constant (Fig. *1*). Cutter diameter may vary without changing longitudinal position of tangent point. However, for any given cam geometry, the follower diameter must be constant. Cam stations may be calculated relative to workpiece stations as in Fig. *3*. Cutter exit point may be held constant only if cutter diameter and follower diameter are constant, otherwise a change in cams is required for each significant change in cutter diameter.

Universal Method Encompasses Tangent and Constant Exit Point

A better method of designing cams requiring a minimum of rework in the event of a change in cutter or follower diameter is shown in Fig. *4*. Constant exit point method (Fig. *4*) calls for a cutter of Radius R_c guided by a cam follower of radius R_f to accomplish a cut as defined by dimensions X, Y, and R_c on the workpiece. Note that cam-disc radius R_d with its center at D (defined by X and Y) guides the cutter-follower center C to describe an arc while the cutter generates points X and Y. When cutter exit point is constant, the geometric relationship ($R_d = R_c - R_f$) exists for any combination of cutter and follower diameters providing cutter diameter is greater than follower diameter.

Tangent point method

When using this method the sum of the cam-disk radius and cam-follower radius must be constant (Fig. *5*). Any change in

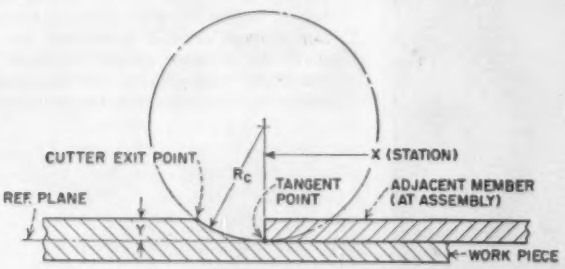


FIG. 1 (CONSTANT TANGENT POINT)

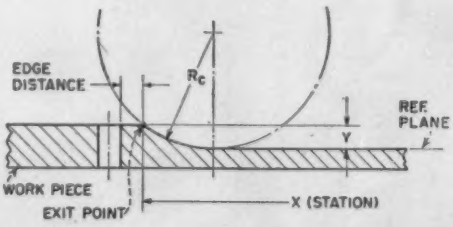


FIG. 2 (CONSTANT EXIT POINT)

cam-follower radius will necessitate a corresponding change in cam-disk radius according to the relationship $R_f + R_d = C$ (constant).

Cam construction

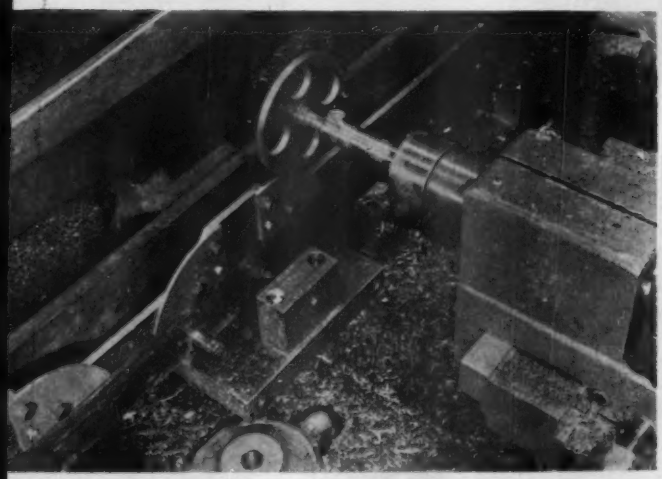
Entire assembly consists of a cam and cam disks (Fig. *6*). Cams are made from ¾-in. 2024-T4 plate for ease of fabrication. Residual stress of cam material is reduced prior to machining by heat treating at 920 F for 60 min, then 2 hr after quenching, followed with a 2% stretch in a 30-ton press.

Cam machining

First step consists of machining a working edge. Second step calls for milling a locating slot and cam surfaces to layout lines. Cam ends are beveled 45°, eliminating need for a close fit between butting ends, and close tolerances on over-all length dimensions. Cam segment radius remains at a constant 3-in. R. To satisfy any change in cutter radius another tracer is selected whose radius, when added to the cam-segment radius, is equal to the cutter radius.

Cam stations

Cam stations are dimensioned from locating slots and fit over the ½-in.-dia pins in cam holder (Fig. *6* and *6A*). Approximately 12 man-hours at 80% efficiency are required to complete one 60-in. cam. Each cam is numbered to correspond to a particular operation, and it is easily removed for replacement by another intended for the next operation. It takes about 5 min to remove and replace four 60-in. cams. Because of the universal method of cam construction, interchangeability regarding variations in cutter and follower diameters can be satisfied by a simple change in follower radius. Therefore no rework of the basic cam is ever necessary. Cost of rectifying errors of construction is also held to a minimum.



Stylus setup

Machining time is reduced, and better surface finish is obtained, when the method outlined below is used. Maximum horsepower can be utilized because there is no limit to the maximum tracing rate for large areas.

1. Set bottoming stops on cutter head to correct depth of cut.
2. Provide clearance between cam follower and cam surface in areas where tracing is not needed.
3. Set cutter relative to basic reference plane of workpiece.
4. Adjust stylus to set block as shown in Fig. 7 to a point where the head reacts to stylus.
5. Adjust head to bottom on stops. Now the actual clearance between cam surface and follower will be less than 0.060-in. because of stylus deflection.

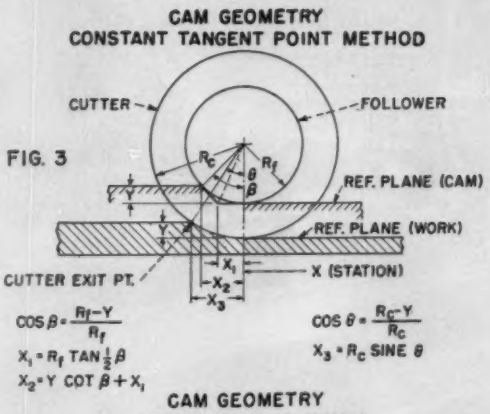


FIG. 3

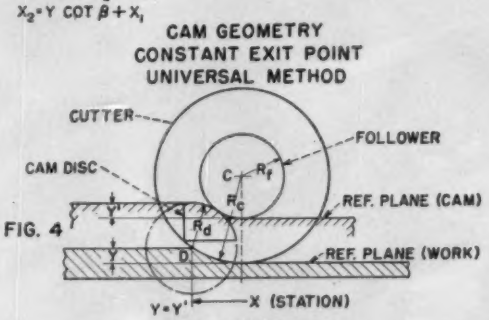


FIG. 4

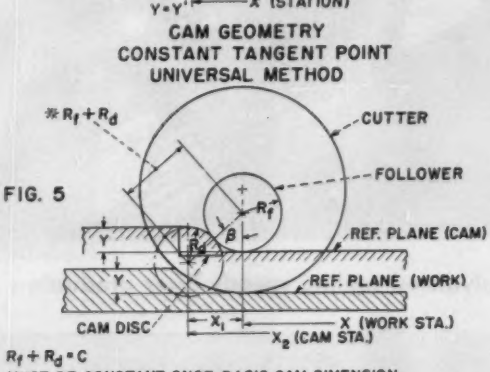


FIG. 5

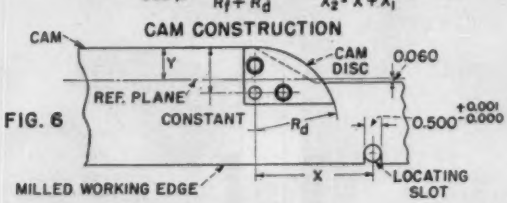


FIG. 6

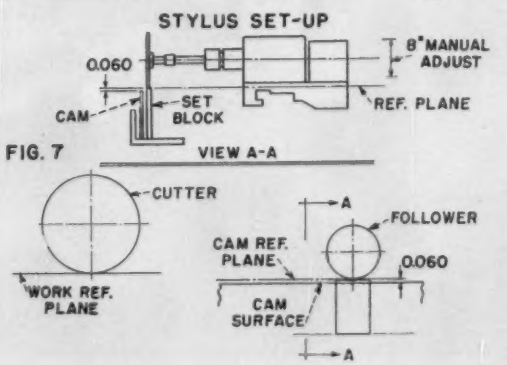
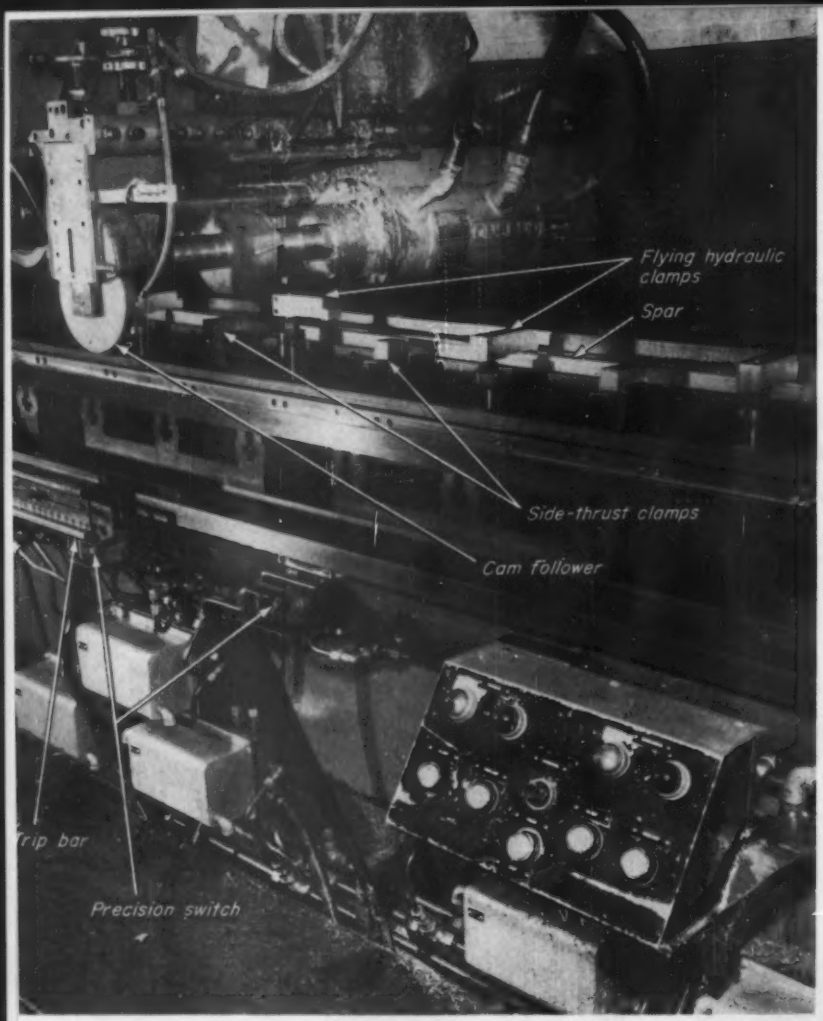


FIG. 7



Advanced tooling speeds Tiger production . . .

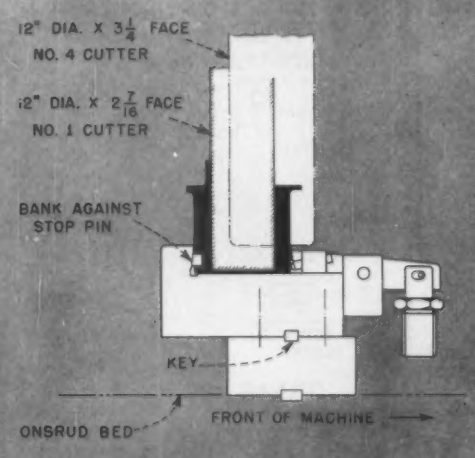
Flying hydraulic clamps . . .

actuated by a trip bar and precision switch, pivot momentarily away from the work to provide necessary clearance when cutter travels over clamped area. Spar-milling fixture, designed for interchangeability and simplicity of setup, has flying clamps spaced 9 in. apart, and horizontal side-thrust clamp located between every pair of vertical clamps. Console panels control each 12-ft bank of clamps, either automatically or manually. Flying clamps permit higher speeds and feeds for one-pass machining because of greater clamping pressures. Other advantages: Clamping ears are eliminated because now clamping is applied directly over cutting areas; spars can be loaded or unloaded at any time during various stages of production

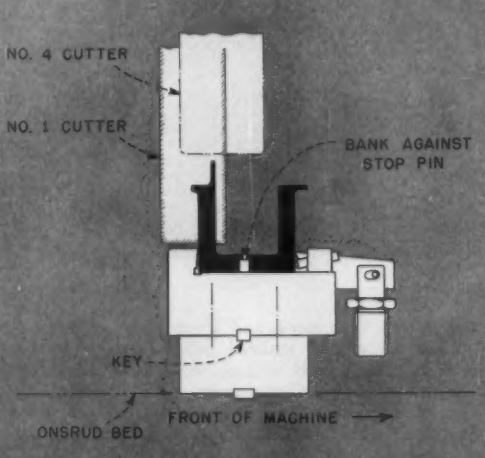
Sequence of five machining operations

shows setup performed at individual work stations to turn out one complete spar for every machine cycle. Clamping is automatic-hydraulic controlled—flying clamps are shown in the third, fourth, and fifth machining cut

Advanced tooling speeds Tiger production . . .



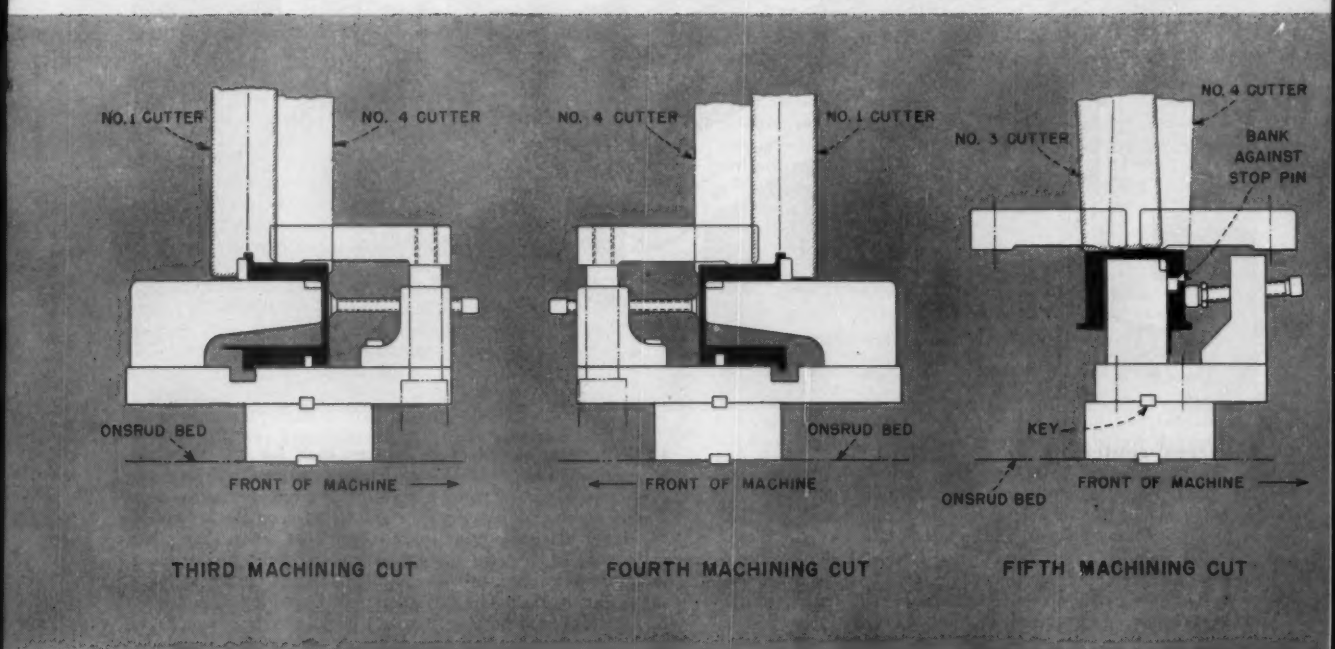
FIRST MACHINING CUT

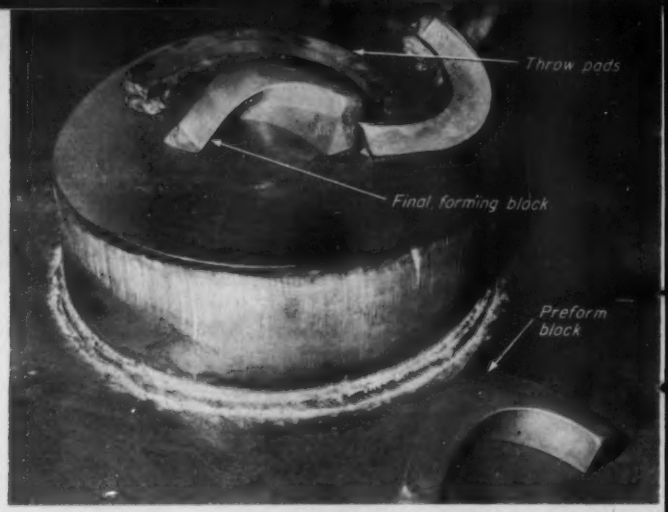


SECOND MACHINING CUT

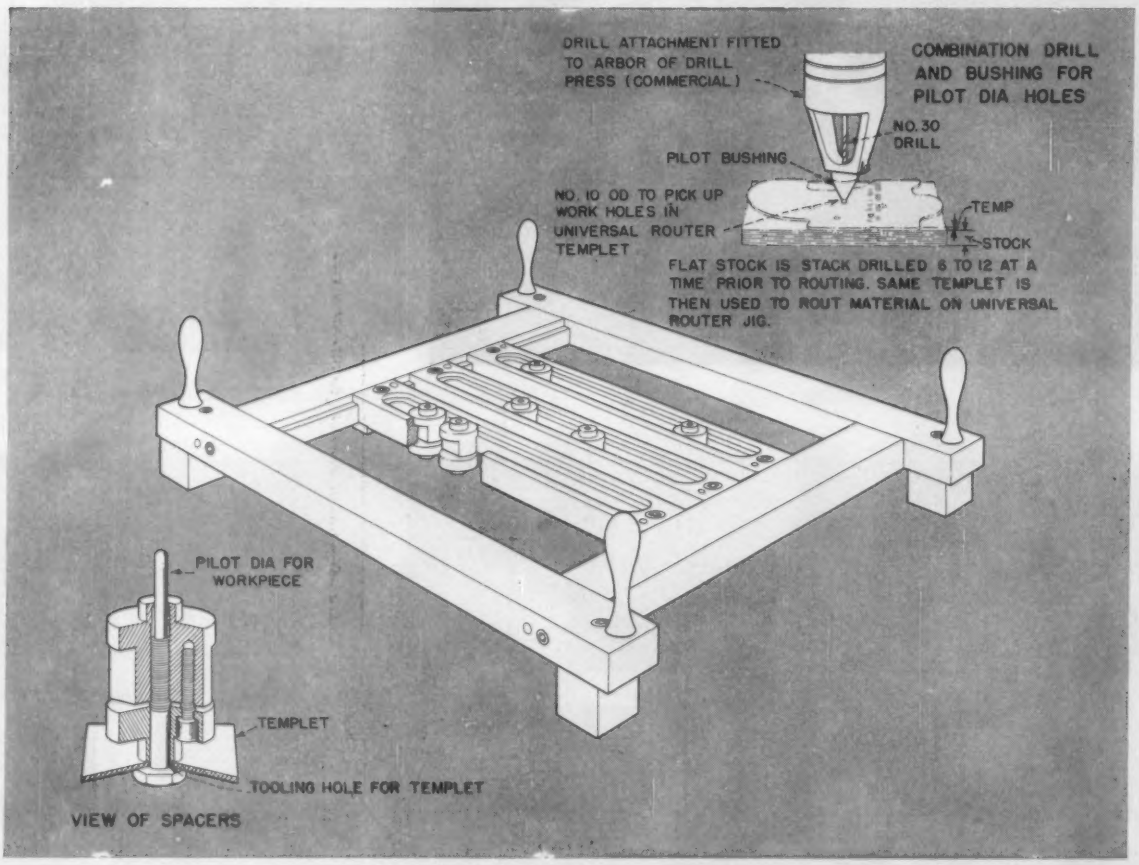
Five spars are setup in-line . . .

on the special milling fixture mounted to the 60-ft bed of an Onsrud miller. Through the combination of cutter heads, cams, and the five work stations, one spar is completed at the end of every machine cycle. At each work station, a different machining operation is performed as the cutter heads are controlled through rise and fall, twist, and lateral motions. After the finished spar is removed, the remaining four spars are moved ahead to the next work station, and a new spar added to the fifth position. All machining is done by climb milling at feeds from 20 to 120 ipm, horizontal spindle speeds of 3450 rpm, vertical spindle speeds of 10,500 rpm, and depth of cuts from ⅝ to 1¾ in.

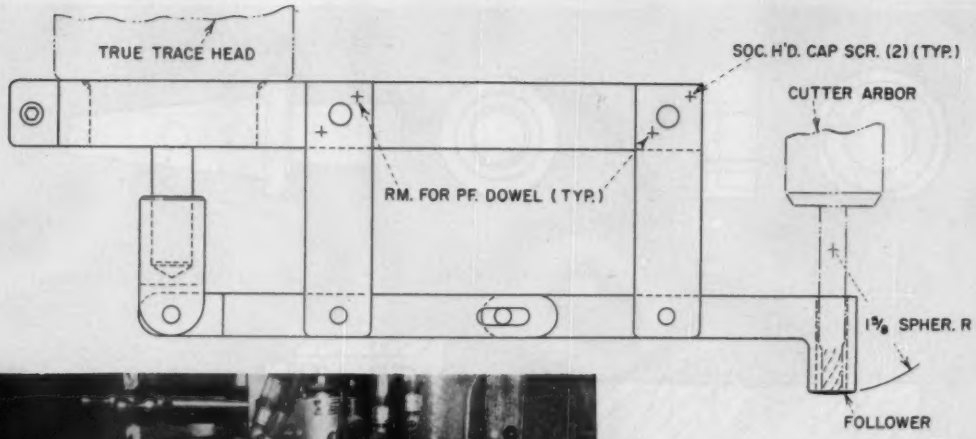




Impact forming . . .
of intricately shaped parts is accomplished in converted Chambersburg drop forge press. Severe compound angles, such as that shown in illustration would be virtually impossible to produce in one piece by any other method. A burn out, 17-in. dia is welded to the base plate and serves as an anvil. Plate from which anvil was cut is welded to ram, increasing ram's weight to 2500 lbs. Pad inserted in the ram cavity is 100 durometer rubber 4½-in. thick. At full impact the press exerts a pressure of 5000 psi, as compared to approximately 2500 psi for a standard rubber press. Ram is pneumatically operated, and metered air allows control from free fall


DRILL ATTACHMENT FITTED TO ARBOR OF DRILL PRESS (COMMERCIAL)
COMBINATION DRILL AND BUSHING FOR PILOT DIA HOLES
NO. 30 DRILL
PILOT BUSHING
NO. 10 OD TO PICK UP WORK HOLES IN UNIVERSAL ROUTER TEMPLET
TEMP STOCK
FLAT STOCK IS STACK DRILLED 6 TO 12 AT A TIME PRIOR TO ROUTING. SAME TEMPLET IS THEN USED TO ROUT MATERIAL ON UNIVERSAL ROUTER JIG.
PILOT DIA FOR WORKPIECE
TEMPLET
TOOLING HOLE FOR TEMPLET
VIEW OF SPACERS

Universal router jig . . .
replaces the need for a separate router board and templet for any given job; it also provides chatter-free routing. Previous tooling required two templets, one for drilling and one for routing. Router templet was then attached to a masonite block, and after required parts were routed, templet and block were usually discarded. Former procedure added considerable expense to the over-all operation. Now one templet serves for two operations: drilling and routing. Illustrated jig can be made to any dimensions, depending upon how much of an overall dimensional spread exists between each job lot. Principle of operation remains the same because within its frame are adjustable spacer-carrying beams that provide flexibility over a wide range of jobs. Templets are mounted on the bottom of the jig by the self-locating spacers (sectional view). The pilot-pin screws are inserted through the tooling holes and screwed into the spacers from the bottom. Tightening of the screws locks the spacers on the beams. Beams are then locked to frame. A combination drill and bushing transfers pilot holes from templet to work. OD of the bushing is made to suit tooling holes in templet



Universal tracing accessory . . .

is clamped to the tracing head and the end mill inserted through the opening provided in the follower. Depth of cut and hydraulically actuated finger pressure are set in conjunction with controls on existing machine. Feed can be manual or automatic

Constant depth is maintained . . .

from surface of workpiece with this inexpensive universal holding fixture when grooves, tracks, steps, and keyways are milled. Special tracing fixture eliminates need for cams and provides direct tracing of production parts with rise and fall and/or skewed surfaces. It also eliminates errors between the cam and inherent variations of tolerances from formed sheet-metal or extruded parts. Constant-depth cuts of contoured surfaces are possible by the addition of horizontal profile cams and locating stops for specific workpieces

Alkaline Descaling by Periodic Reverse

Two chemical baths have been developed at Grumman to provide for the economical removal of iron oxide from heat-treated steels. Both baths are similar in nature in that they are alkaline, and employ periodic alternation of polarity of the work to be descaled.

Solutions contain separating agents, caustic soda, sodium cyanide, and other alkaline compounds of a proprietary nature. With the exception of the sodium cyanide, the rest of the materials are not uncommon in the makeup of electrolytic steel cleaners. However, what makes this process different is the bath makeup. Most electrolytic steel cleaners operate in the vicinity of 6 oz/gal and a temperature range of 180-200 F. Baths for this new process require 10-16 oz/gal of soduim cyanide and in the order of 30-40 oz/gal of the proprietary material.*

Secondly, the temperature range effecting best operating conditions is 120-130 F. Despite the high concentrations of these cleaners, they are surprisingly economical to operate and have long life. They are often operated for one year before a new bath is made up.

When these cleaners were first installed at Grumman, it was discovered that reverse current alone was not sufficient to remove some of the higher-oxide scales encountered on high heat-treatment alloys because of the tenacity of scale. On the other hand, direct current had little effect on the lower oxide layers close to the surface of the base metal. A combination of the two (ie, periodic reverse) resulted in satisfactory removal of both kinds. The reverse cycle permits migration of cyanide ions to the work which aids in dissolving the lower oxide scales and the direct cycle results in the evolution of hydrogen gas which mechanically lifts the higher oxide scale. It is also believed that oxygen evolved in the reverse cycle has a tendency to form less tenacious higher oxide scale which is subsequently lifted during the direct cycle. This secondary effect is not complete during one reverse cycle and is certainly not instantaneous but progresses during the total immersion time.

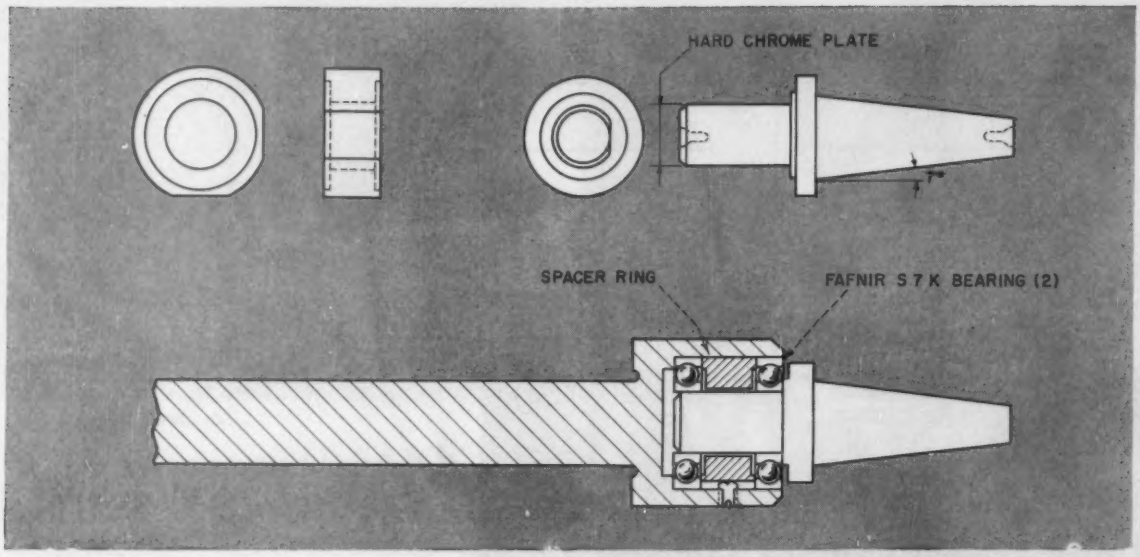
The life of the cleaner bath is prolonged by removing contaminating organic substances which are carried into it. Both decantation and activated-carbon treatments may be used. Secondly, dissolved metallic ions are plated out at low current densities in a manner similar to the purification of electrolytic plating solutions. One 600-gallon cleaner has been operating for two years without renewal.

There are some instances where alkaline descaling, alone, has proven to be unsatisfactory. Some high-alloy steels have scales developed which are virtually impenetrable. It has been necessary to first pickle these alloys to penetrate through to the base metal and then follow with the alkaline descaling treatment. There are still other kinds of scales such as are developed on stainless steels where this technique is totally unsatisfactory. The acidic-type treatments are required for removal of this scale.

It is important to maintain the concentrations of the ingredients within the specified limits to obtain the optimum in efficiency. A weekly analysis has proven satisfactory. Although these cleaners tolerate an uncommonly heavy metallic and organic soil load, the one contaminant which is surprisingly troublesome is wetting agents. Although this is contradictory to all accepted principles of cleaner formulations the reason is fundamental. Advantage is taken of the accumulation of gases on the surface of the steels to lift the loosened scales. Wetting agents promote the rapid evolution of gases in the form of small bubbles which do not exert the force of larger bubbles. Consequently, the efficiency of the cleaner is impaired.

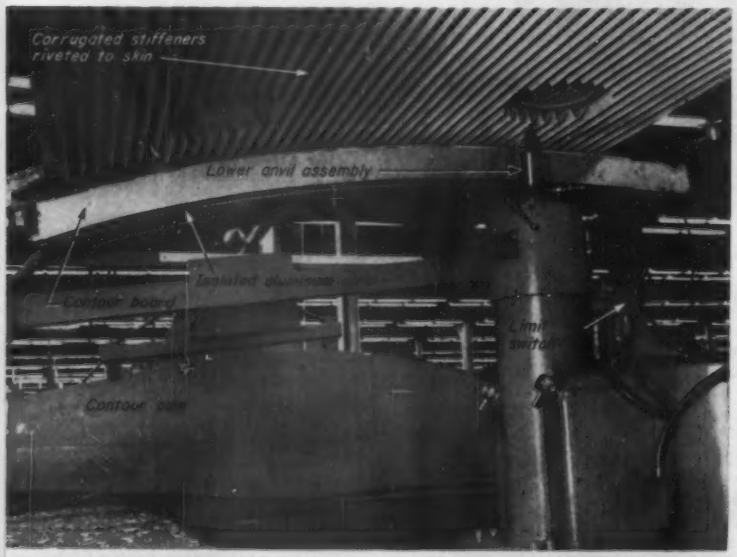
**Oakite Pdts, Inc, NYC, and Enthone Inc, New Haven*

Advanced tooling speeds Tiger production . . .



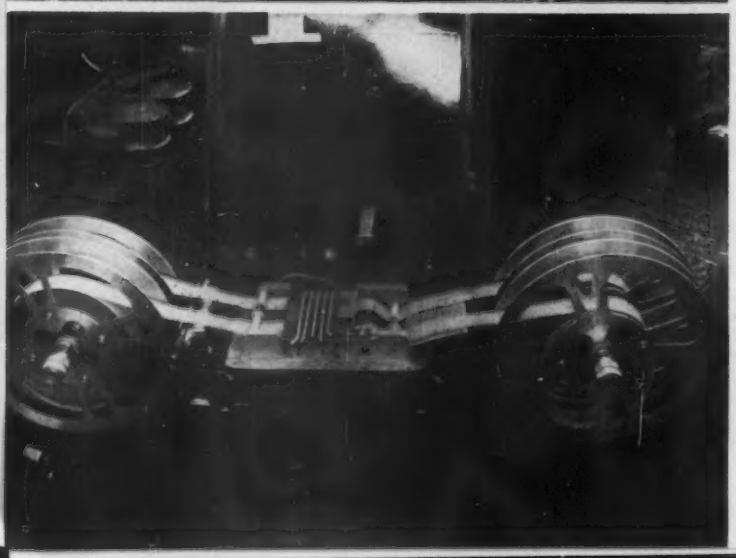
Rotating stylus . . .

permits use of soft, less-costly materials for templets because no wear takes place between stylus and templet when tracing. Other advantages are: less operator fatigue, interchangeable pilots provide higher degree of accuracy, and 7° taper permits accurate compensation for adjustment from rough to finish cuts, because, with this particular taper, the degree of pilot adjustment becomes a linear measurement reading in increments of 0.001 in. or less



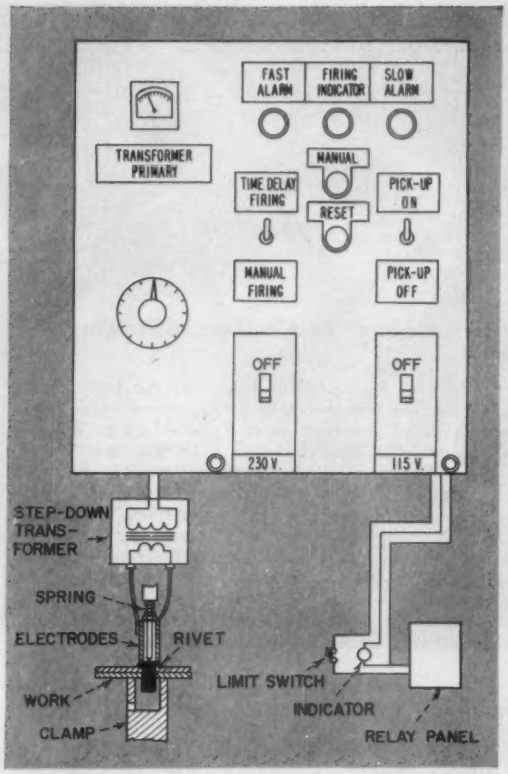
View of wing panel . . .

taken from below tape-controlled Drivmatic shows panel held in place by simple floating-contour boards mounted on rods fastened to a large frame suspended between carriage ends. Contour boards have a floating action to permit centering of the corrugation crest relative to drill spindle. This particular riveting operation presents a little more difficult tooling, because unlike most riveting jobs, here a corrugated sheet is riveted to the underside of wing panel. It therefore becomes imperative that the tooling must maintain the erratic centerline of the corrugated crest in direct line to the centerline of the drill and rivet spindles. Contour cams mounted on end carriages provide means for bringing the workpiece normal to drill spindle for each line of rivets. Aluminum strips slightly wider than the contour boards safeguard machine and tooling by shorting against lower anvil in event it should malfunction. Lower anvil must be retracted, tripping limit switch, before row-to-row indexing can take place. Operation of riveting machine is otherwise relatively the same, as previously reported (*AM*—Jan 30 '56, p85 and Dec 3 '56, p180). Tape-control has resulted in saving 104 man-hours per plane, or a production increase of 500%



Tape is punched . . .

from a first piece predrilled setup, positioning the workpiece by manual control. Rivet locations are found by a light source set in drill-head spindle and a photoelectric cell in lower ram assembly, thus eliminating the need for jogging from one rivet location to another. Additional tapes are punched from the master on the Grumman designed and fabricated tape duplicator shown at left. Tapes are made from light-struck 35-mm film pierced by key-operated punches manually depressed. As the master tape and a blank are passed through the duplicator, pilot lights indicate an existing hole on the master, operator then presses corresponding key to pierce the copy. Plans are now in the making to completely automate the copying process, employing solenoid-actuated punches instead of pilot lights and keys

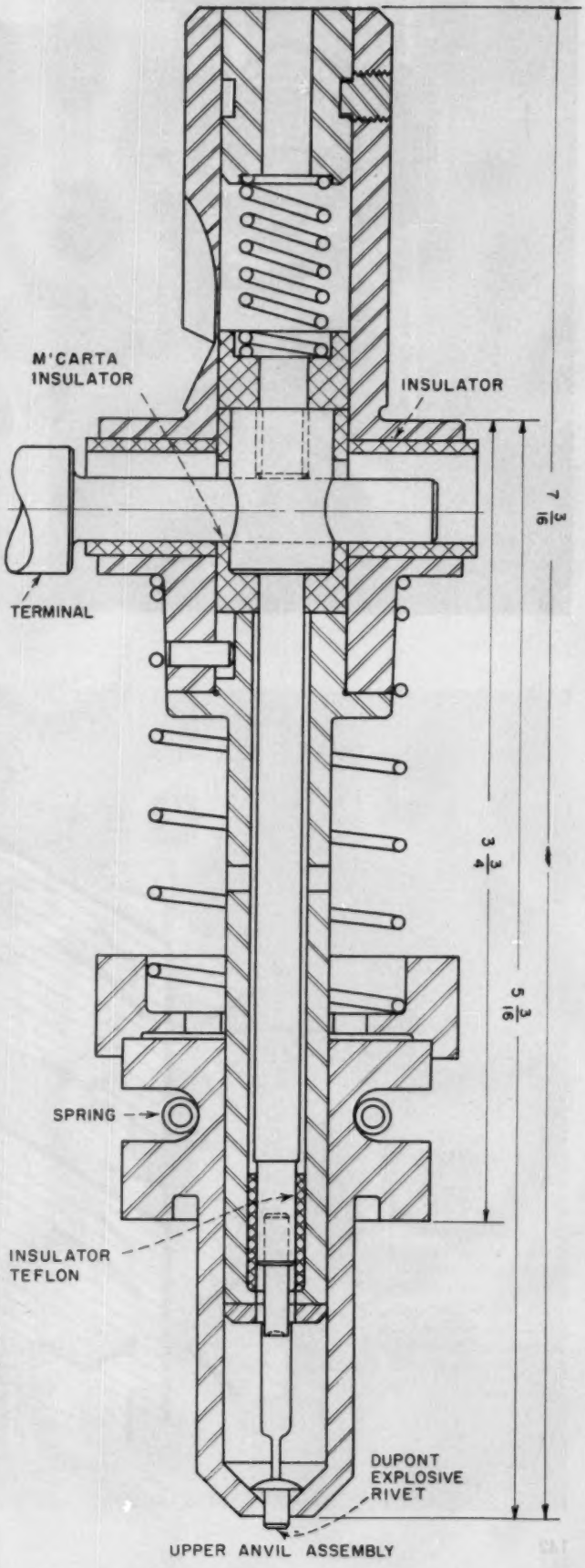


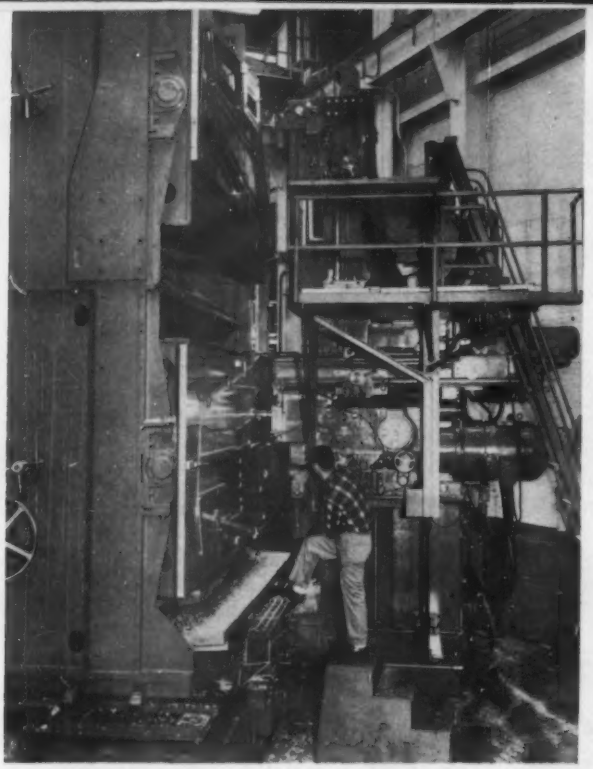
Controller . . .

designed and built by E I Du Pont after experiments with Grumman fires explosive rivets in a Drivmatic in conjunction with tape control of machine motion. Machine cycle starts with drilling a hole, inserting a rivet, and starting the controller action. When rivet has fired, the riveting machine is automatically re-cycled. Firing is done by subjecting rivet head to a high current through two electrodes in contact with rivet. Electrical resistance of rivet-metal produces required heat to ignite the powder. Rate of heating, and subsequent firing time, is proportional to the value of the current. Controller incorporates an adjustable voltage transformer, adjustable time delay relay, control relays, and pilot lights to indicate status of operation

Upper anvil assembly . . .

used for pick-up and firing of explosive rivets. Its mechanical operation is the same as standard anvils in that the pick-up and rivet release principles are identical. The main difference, however, is in the internal construction. The center stem is one of the electrodes and is completely insulated from rest of anvil. The hot terminal is connected to this electrode. Other terminal is grounded to the outer shell; thus two electrodes are ready to supply current when controller demands

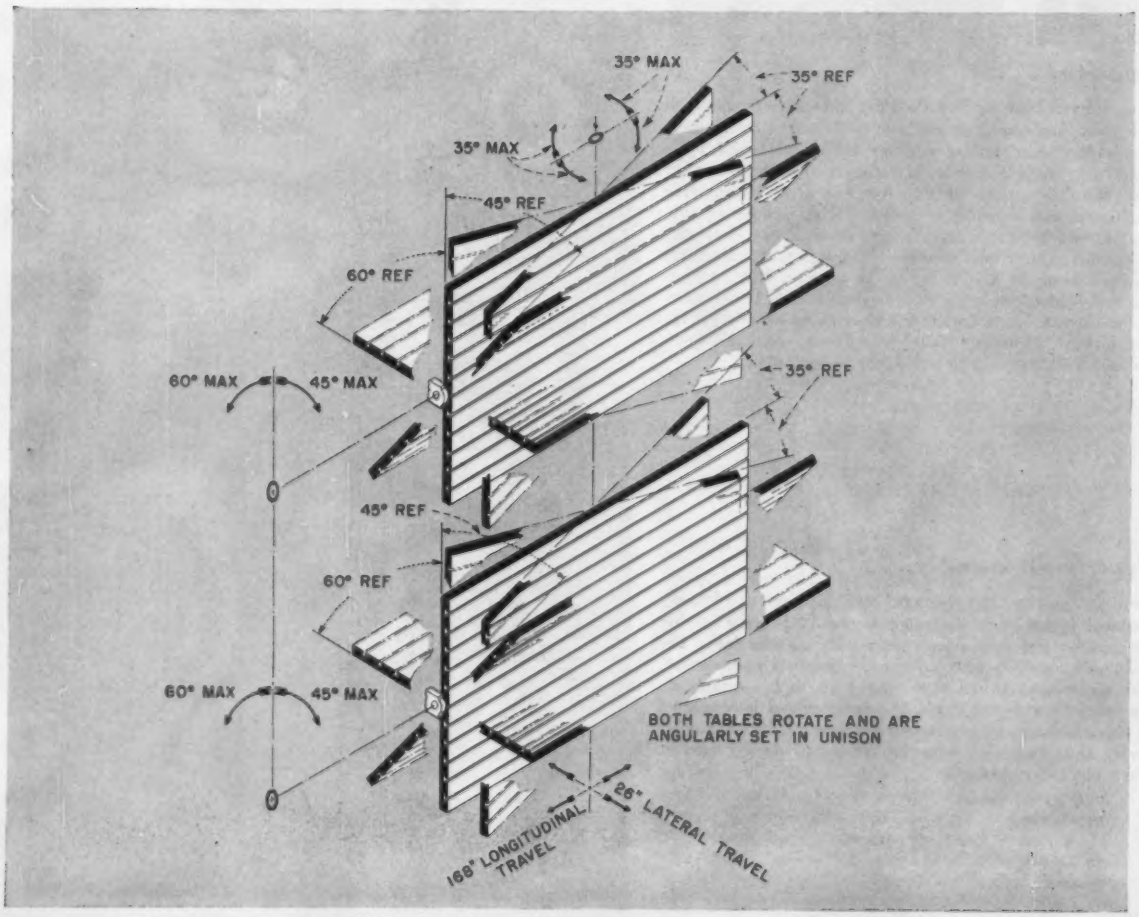




Advanced tooling speeds Tiger production . . .

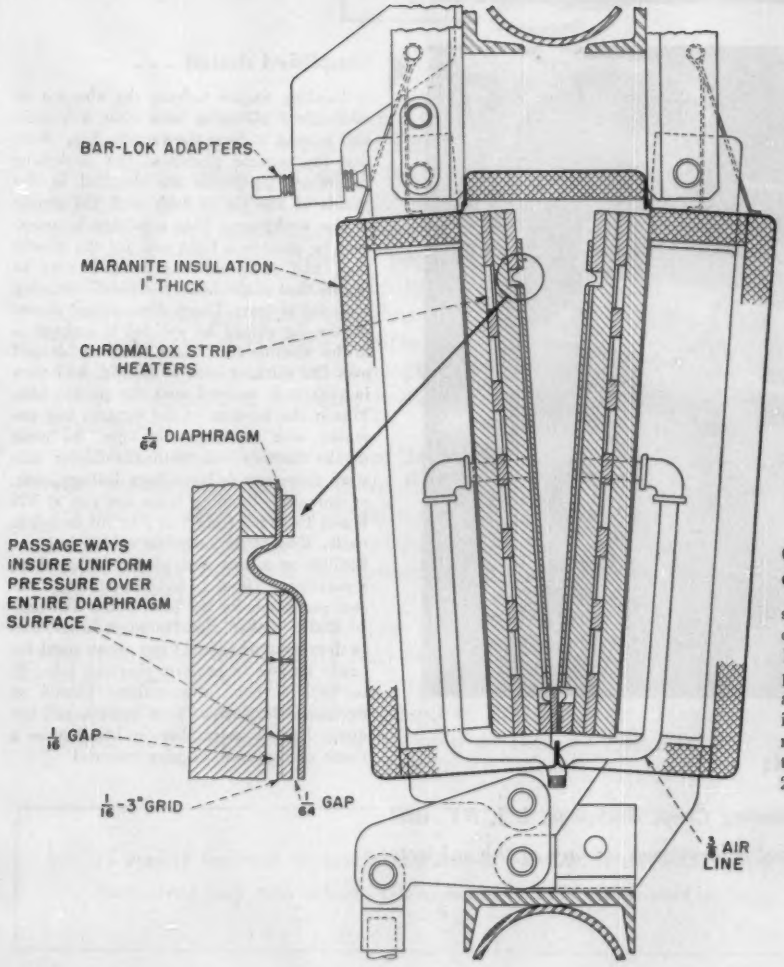
"Venetian-blind" workholding and tracing tables . . .

permit 3D-360° tracing while using only the four basic machine motions. The two tables work in unison (similar to a venetian blind) from one set of segmented cams. Tables tilt and rotate by manual control while transverse feed, tracing, and rise and fall operate according to the dictates of the templet and cams, thereby permitting the plane of machining to be always normal to machine travel. Universal motion also makes possible the 3D machining of acute curves because the tables can be tilted to a degree at which tangential machining is possible. Other advantages include use of simple, inexpensive, segmental cams, and the machining of more complex designs that could not be machined by conventional tracing equipment



Double-diaphragm chuck . . .

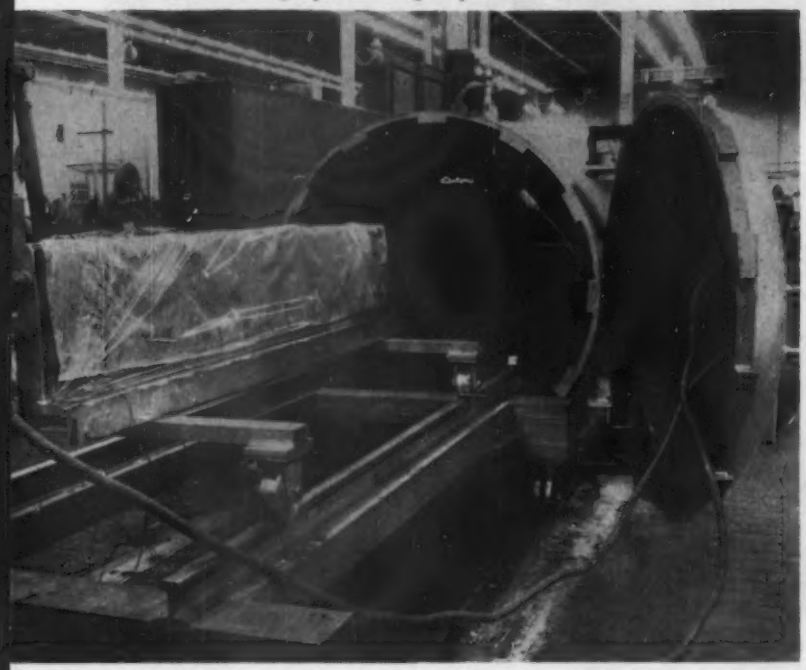
for production bonding honeycomb wedge-shaped flaps. Principal advantage of this design is the ability of the double diaphragm to average out in the bonding operation variations that have built up in the final assembly from accumulative tolerance. Because of this ability, a far more accurate and higher-quality assembly is obtained. Conventional bonding fixtures, having one bank mounted rigidly and the other half used for clamping, force all variations to one side of the final assembly with the result that subsequent machining operations are more difficult



Cross-section of double diaphragms . . .

shows sandwich construction and location of heating elements. Note in insert the 1/64-in. thick outer diaphragm, whose primary function is partially to absorb and also to distribute all variations occurring in the final assembly. Outer diaphragm is made from 6061-0 aluminum and sealed to the jig with silicone rubber cement No. 251 (Connecticut Hard Rubber Co)

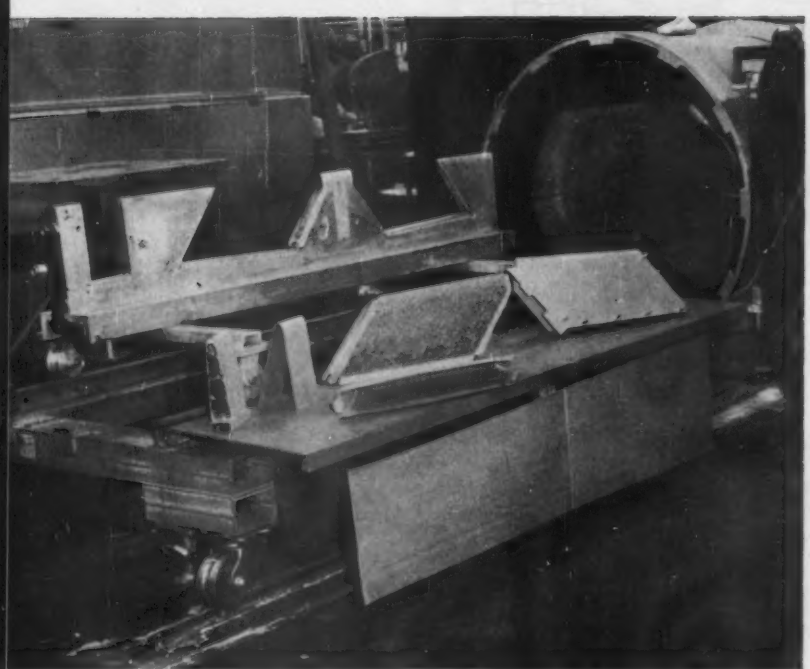
Advanced tooling speeds Tiger production . . .



Honeycomb bonding . . .

in an autoclave, using neoprene rubber as the vacuum bag material, proved to be a very costly and time-consuming method. Now Grumman engineers are using Mylar* polyester film 0.001-in. thick as a vacuum bag, and sealed to the jig with Presstite** No. 155 tape, produced better results than could be achieved with the rubber bag. Advantages of using Mylar film are many: cost of bagging material is reduced 90%; setup time is reduced 50%; tooling is simplified as no clamping rings or mechanical fasteners are needed. Process is 100% successful as no failures have been recorded to date; and all leakage failures have been eliminated because the plastic bag is disposed of after each batch is run. Hose line, attached to top of jig, draws vacuum through openings located around entire profile of jig. Lower hose is a return line to the vacuum gage located on outside of door. Because readings are tapped from the least efficient point in the line, a more accurate reading of the vacuum being drawn within the jig is obtained

Mylar type C—E I Du Pont
***Presstite Engineering Co—1-in. wide thermoplastic tape*



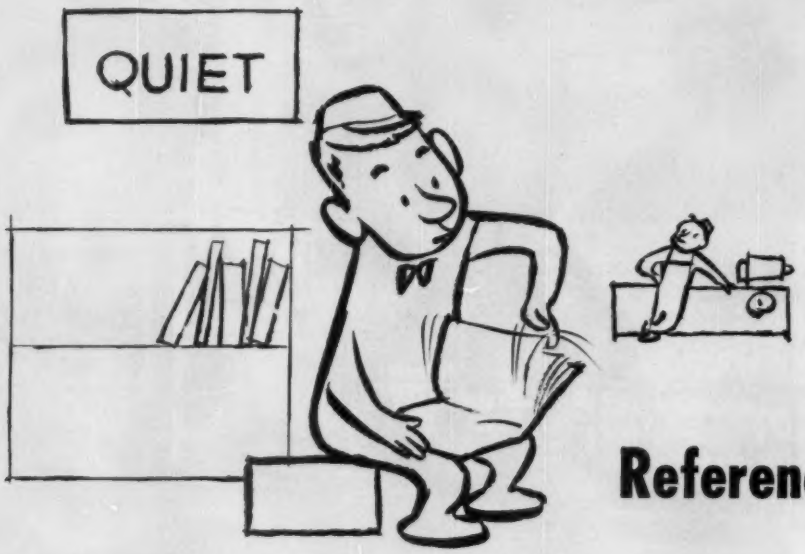
Simplified design . . .

of bonding fixture reflects the absence of mechanical clamping now that a plastic film is used to form the vacuum bag. Note that the surface planes of the workpiece profile and jig profile are identical, ie, the profile of the jig is flush with the profile of the workpiece. This condition is necessary to provide a tight seal for the plastic film, and to avoid any irregularities in profile that might cause the plastic bagging material to tear. Three dimensional planes on the jig should be avoided if leakage is to be eliminated. Glass cloth is draped over the working area of the jig, and then in turn it is covered with the plastic film. Finally the borders of the vacuum bag are sealed with thermoplastic tape. In none of the batches run with the Mylar film were there any failures from leakage, tear, or porosity. Bonding heats are run at 325 F and 15-30 psi from 5 to 7 hr for complete cycle. Cost of the neoprene rubber bag was $387.00 or a unit cost of $25.80 based on a maximum life of 15 batches per bag. Unit cost per batch for the plastic film and tape is $3.87. Other disadvantages attributed to the neoprene vacuum bag were: need for costly tooling to perform shortrun jobs, 30 to 40% of bonded assemblies passed on deviations because of poor quality, and frequent loss of assemblies in bonding as a result of ruptured bagging material

FOR MORE INFORMATION:

Grumman Aircraft Engineering Corp, Bethpage, L I, NY, will be glad to supply additional information on any of the subjects discussed in this report

Round Table



Reference Corner

"Ed; I think we ought to have a company library for technical books and reference material of all kinds. We spend too much time trying to get answers to questions that could be covered in a small reference room."

"Seems like you ought to get your own technical books, Al. I don't think a company library would get much use. You couldn't let off the workers during their shifts to go there, so about the only interested people would be a few foremen and probably the engineering department."

"I think we could save a lot of time and prevent pointless arguments if we did let workers use a library once in a while, Ed. I know we've wasted plenty of man-hours arguing about things that could be answered easily by a small library."

"Maybe so, Al; but you'd just be inviting the men to go and loaf for half an hour. Besides, there are plenty of reference books around the shop, here. All you have to do is go and borrow them. Most of the men would be happy to let somebody else use their pet handbooks."

"Sure; but how do you find them? There may be a lot of learning in the shop, but it's stored away. Maybe we could get some of the men to donate their books to the library. If not, the company could get a lot of good useful stuff for a couple of hundred dollars."

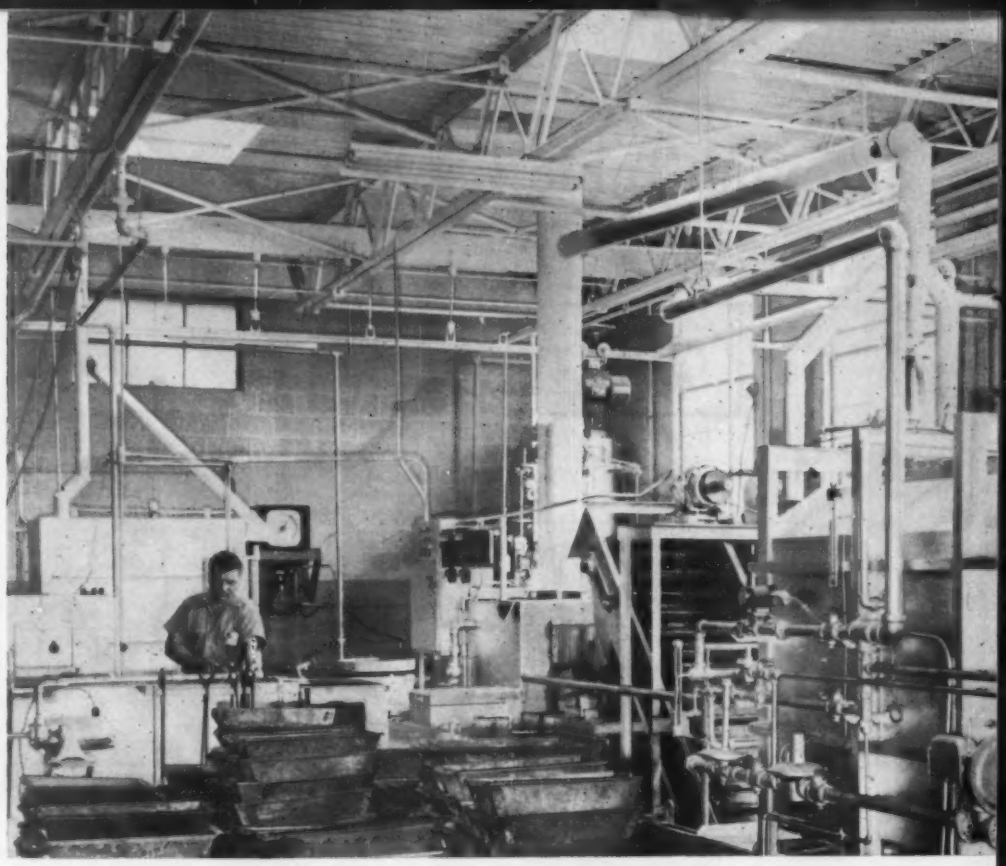
"I don't think the company would go for it, Al. It sounds like a waste of money . . . one of those schemes that sounds fine when you first think of it, but soon dies a natural death because of disinterest. Even if we did have a library, a lot of foremen wouldn't let their men take time off to go there, in spite of company permission."

"I'll bet it would be worth while if only one man used it each day, Ed."

"You'd probably get all the books stolen in short order, anyhow. The company wouldn't hire a regular librarian."

"Maybe somebody in an office could keep an eye on it, Ed. It ought to be worth a try."

IS a small technical library for the shop a worth-while addition, or is it a waste of time as Ed thinks? Your ideas may help others. Discussions of earlier topics start on page 212.



One man . . . operates this combination snap-hearth furnace, washer and dryer, and can also handle miscellaneous batch heat-treating. Pans of work are loaded into a powerlift loading hopper, shown upper right in position to discharge screws into a feeder adjacent to the hearth extension

Modernized Plant Adopts Mechanized

Heat-treating of screws and rivets has been integrated into the plant's handling system in a program that has cut handling costs more than 75%. Quality is up—a further advantage in a highly competitive business

FRANCIS A O'BRIEN,
production manager,
CONNECTICUT SCREW & RIVET CO., INC.
WATERBURY, CONN.

Conventional batch heat treating gets a hard look when a production manager reviews his handling costs. That was certainly the case when we started to plan a smoother production rhythm from headers to slotters, to thread rollers, to washing and drying and eventually heat treating and shipping.

To reduce in-process handling in the heading and machining areas we installed roller and belt conveyors. To clean up the problems of batch heat treating a wide variety of small threaded products ranging in size up to ⅜ in. dia, we purchased an automatic snap-hearth furnace and washer-dryer combination.

This gas-fired installation was engineered and built for us by Surface Combustion Corp, Toledo, Ohio, to deliver clean, dry parts ready for plating or other surface treatment regardless of whether they are straight hardened or thin-case carburized or carbonitrided. No handling is involved at the furnace once the operator dumps a tote box of work into the powerlift hopper lowered to floor level. The hopper lifts the load to a chute which discharges into a vibratory feeder. And the feeder meters a full and even layer onto the furnace's hearth extension.

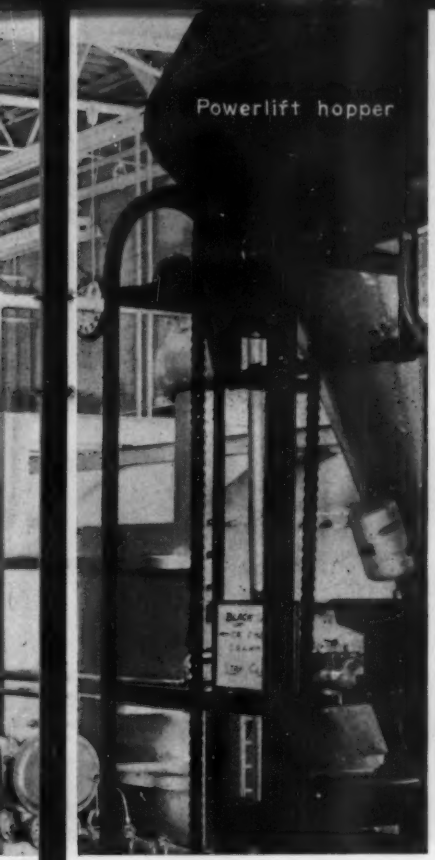
The snap-hearth furnace is of the reciprocating-conveyor type. Operating temperatures are from 1400 to 1700 F. At 1550 F the furnace can harden up to 300 lb of screws per hr, depending on the particular heat-treatment process and part size.

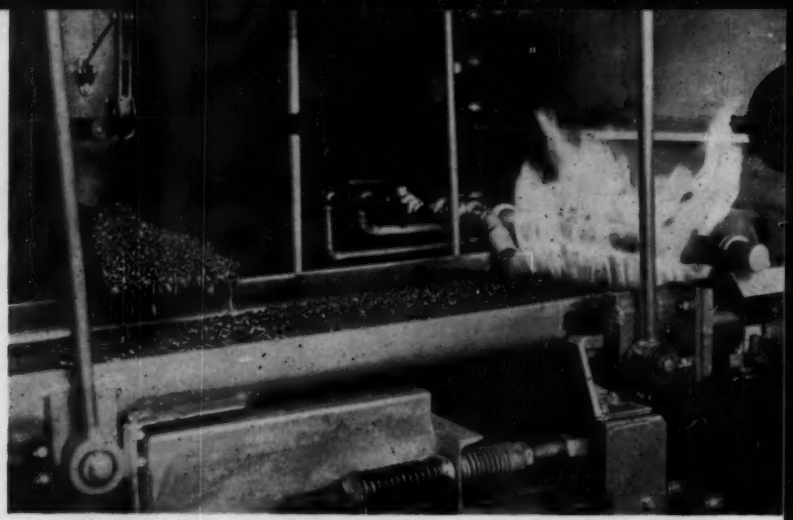
DESIGNED FOR LESS VIBRATION

Parts are conveyed through the furnace by periodic snapping of the furnace hearth. An external mechanism, consisting of a ¾-hp motor, variable-speed drive, speed reducer and eccentric cam, slowly draws the hearth backward a short distance and at the same time compresses a coil spring. When the spring is released by a step in the cam, the hearth snaps forward, then is suddenly stopped by a heavy counterweight.

Inertia of the work moves the parts forward on the hearth a controlled distance. Counteracting springs located on each side of the shaker section, and the heavy counterweight, combine to reduce vibration and shock ordinarily to be expected in this type of operation.

The heat-resisting alloy hearth is 18 in wide with vertical sides high enough to keep work confined to the hearth. Five pairs of spring-mounted alloy rods





Vibratory feeder . . . meters parts onto the hearth in a full, even layer, and the hearth's snap action advances them through the furnace at controlled speed. These mechanical features, plus modern temperature and atmosphere control, produce products of uniform quality

Heat Treating

hold the hearth suspended in the heating zone and loading space. These rods pass through the top of the furnace and are held by modified ball and socket joints, in a framework, to permit smooth and level operation of the shaker mechanism.

The hearth passes through an opening 18 in. wide by 2 in. high at the inlet end of the furnace. This opening is adjustable in height, permitting less atmosphere loss when running small parts.

SEPARATE QUENCH CHUTE AND HEARTH

An alloy-steel quench chute extends downward from just below the discharge end of the hearth. A plain steel extension is attached to the alloy chute, permitting the outlet to be below the level of the quench bath. This arrangement not only stops entry of outside air into the furnace, but also prevents transmission of vibration from the hearth to the furnace proper.

Parts drop out of the furnace in uniform quantities. A conveyor in the oil-quench tank takes the parts out of the quench and drops them onto a belt that carries them through a Surface-designed washing and drying machine. About 90% of the screws require no tempering and are ready for plating or other surface finishing operations as they come off the washing-machine belt. The parts that require a draw are batch drawn in a small convection furnace.

WASHER USES IMMERSION BURNERS

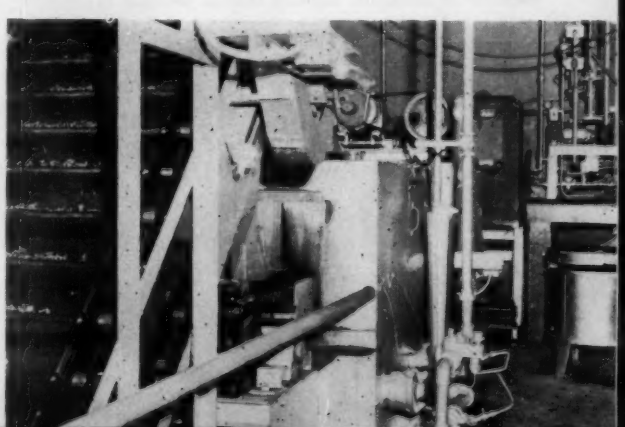
The washing and drying machine at the end of the heat treating line uses Surface immersion burners that include eductors at the tube outlet. These eductors permit fast, efficient heating and also provide a means of removing heat from the tank when required.

CAN USE DIFFERENT ATMOSPHERES

Atmosphere for this equipment is furnished by a Surface 500 cfh MRX gas generator. The generator gas is composed of approximately 20% CO, 40% N_2, and 40% H_2. Connecticut Screw uses the atmosphere as it comes from the gas generator for straight hardening. For carbonitriding, which is needed on most of the screws, a slight amount of ammonia is added, as well as propane. These gases are manifolded into the furnace so that they are mixed intimately, permitting uniform casing.

Many of the screws produced by this company are thin and require a case depth of 0.0035 to 0.004 in. This depth is critical, because any variation in depth can be quite high percentage-wise in the effect on the total properties required.

Operating at 1550 F with a production rate of 300 lb per hr, a case depth of 0.0035 to 0.004 in. is obtained. The parts are in the furnace from 15 to 20 min., depending on the size of the part being heat treated.

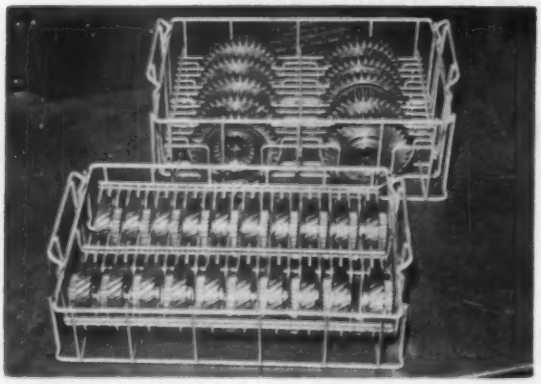


Flight conveyor . . . removes threaded products from the quench and delivers them to a washer-dryer. Atmosphere generator and dewpoint controller (right) take up little space and are here placed in an out of the way corner

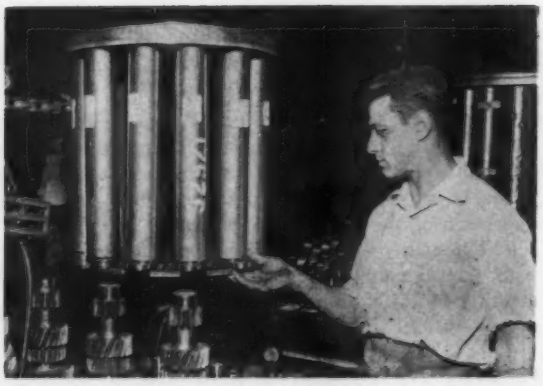
SHOP SHOTS

at New Process Gear Corp. Syracuse, NY

New Model 540 . . .
transmissions are assembled on pallets on progressive lines. Note powered ram for installing countershaft subassembly at first operation

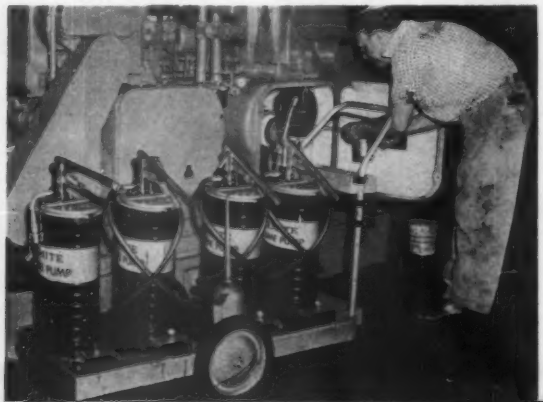


Specially designed . . .
metal baskets are made with formed nests to handle gears, shafts, and subassemblies on floor or conveyors

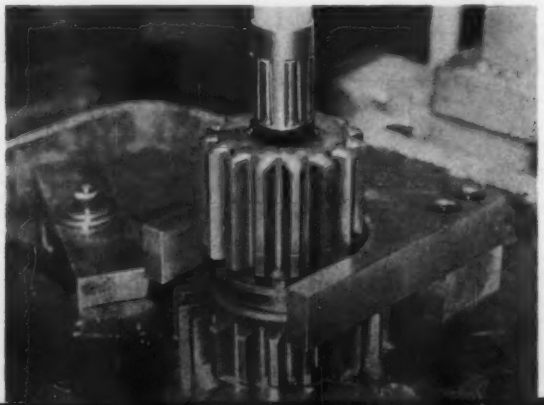


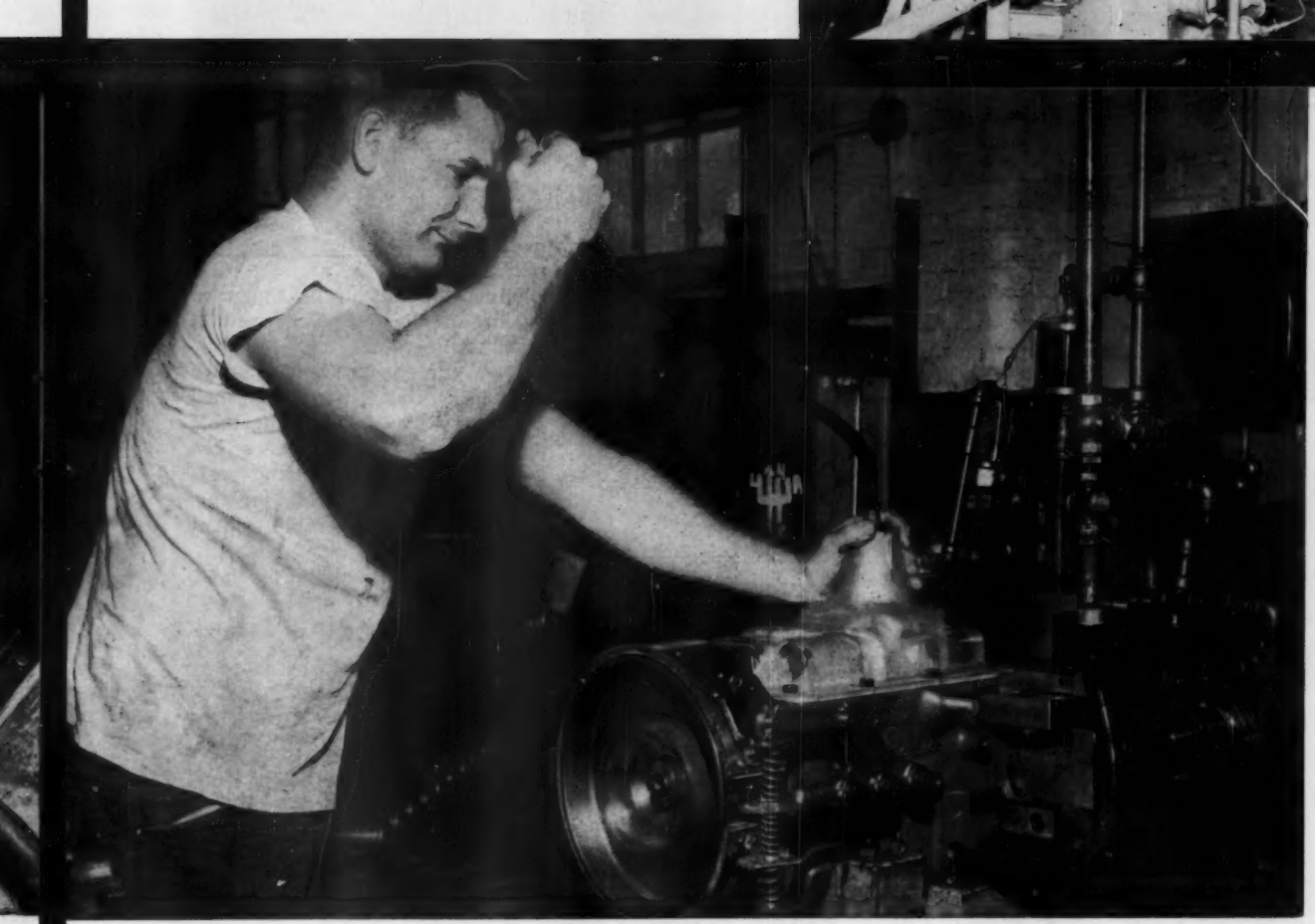
Dispenser . . .
holds several sizes of bearings, releases one at a time through rotary gate. Empty tubes are readily replaced with prefilled ones.

Service carts . . .
carry supplies of various types of lubricants needed to keep machines in condition, circulate through designated areas

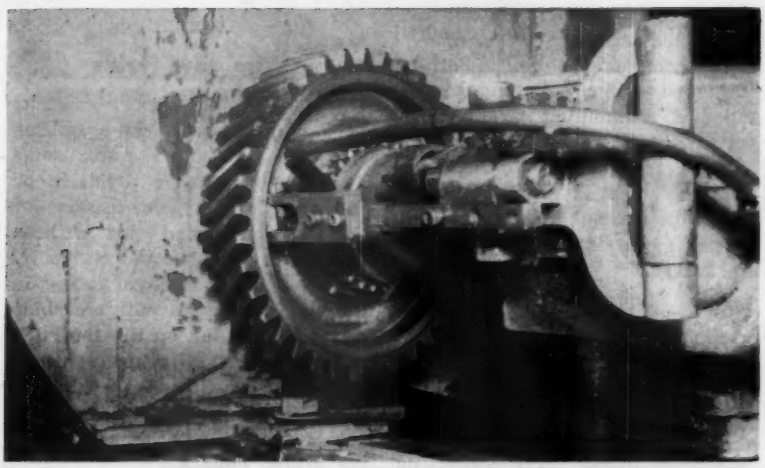


Roller burnishing . . .
tool insures exact size and extremely fine surface finish on bronze bushings of reverse idler gear

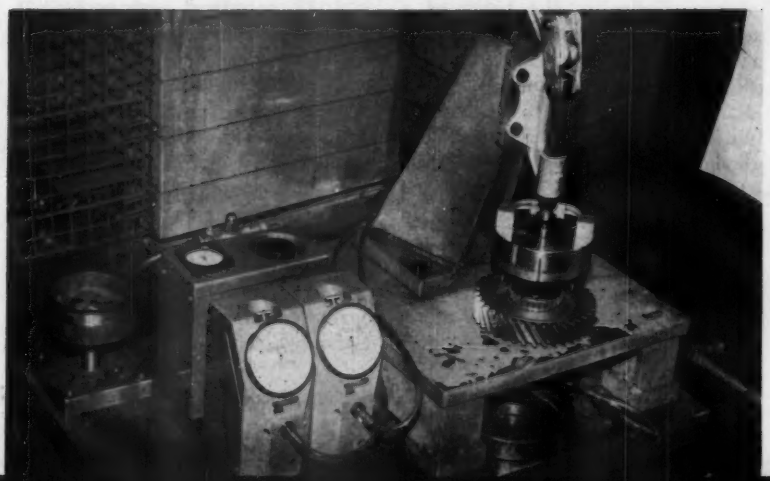




Full-speed running . . . test checks for quietness of gear shifting operation. Note die-cast aluminum cover which aids in over-all weight reduction.



Home-made machine . . . hones a 7° angle for synchronizer stop ring on ID of second-speed gear of new truck transmission



Special air-gage . . . head measures 7° angle to 0.0002-in. roundness. Taper provides friction surface for aluminum synchronizer ring

Practical Ideas . . .

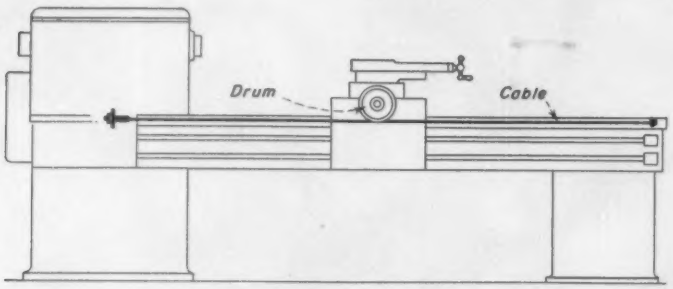


Fig 1

Fig 2

Drive On Crossfeed Produces Tapers

A lathe not equipped with a taper attachment can still be made to produce tapers by adding a drum on the cross-slide feed screw. This drum, with a properly calculated OD, and driven by a cable, will produce accurate parts. If desired taper is "t" inches per foot (on diameter) and cross-slide feed screw has "n" threads per inch, the drum should be diameter "d". To find "d":

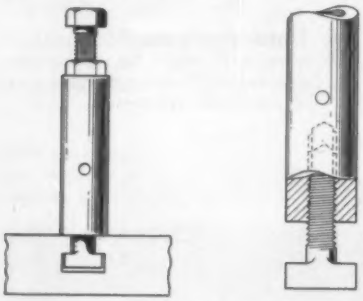
$$d = \frac{24}{\pi n t}$$

When the hand crank on the feed has been replaced by the drum, a few turns of cable is placed on the drum. Each end of the cable is then attached to the lathe, forming as straight a line as possible between the tie-in points. The center of the winding is secured with a small screw and clamp after the cutting tool has been positioned at the center of the work.

Cable can be arranged as in Fig. 1, which will produce a counterclockwise rotation of the crossfeed screw as the carriage moves toward the headstock. This will result in a taper greater in dia at the headstock end. Fig. 2 arrangement reverses the process, rotating the screw clockwise.

The compound is used in setting the amount of cut. For machining tapers it is mounted parallel with the crossfeed ways. When cutting threads on a tapered part the compound is set at 29° to the finished side, thus creating a means of feed as well as providing side relief for the thread.

Haim Murro, Tel Aviv, Israel



Setup Jacks Stay Put

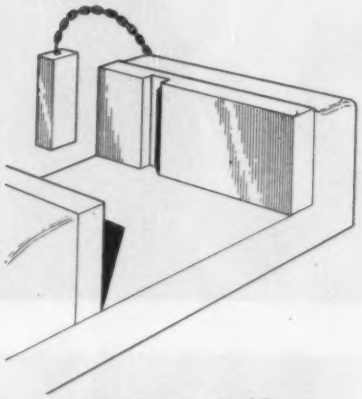
Many job shops do short-run work on relatively large castings or weldments that require milling or planing. Although there are any number of adjustable jacks and setup blocks commercially made for leveling straps and setting up work, all must be repositioned for each setup.

To eliminate time-consuming and often cumbersome processing we made the standardized units shown. Basically, the heart of a unit is a piece of bar stock which is made in several lengths to fulfill all possible demands. It is drilled and tapped at each end with a cross hole through the center for tightening to the table.

A short square-headed bolt made to fit the T-slot is used in fastening the jack to its proper location on the table. A cap-screw equipped with a locknut is screwed into the top of the bar to a depth consistent with the job. At this position the locknut is tightened against the bar to prevent the bolt from turning.

When these jacks are used under both jacks and clamps, a finished piece may be lifted off the table and jacks. The next piece can then be placed in the same position without unnecessary jogging, resulting in a considerable amount of time saved.

Buckley Sullivan, Cleveland, Ohio



Key In Vise Jaw Holds Work Square

To square up work in a milling vise on production runs some means, other than a precision or machinist square, is necessary.

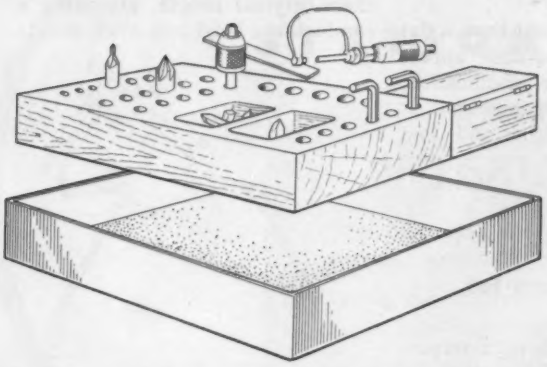
We accomplished this without much work or fancy fixtures by simply using a removable key in the vise. A fine cut with a carbide cutter, was taken on the top edge of the vise insert to insure parallelism. It was then removed from the vise, and a keyway was ground across the insert precisely 90° to the milled edge.

To this keyway a hardened key is fitted, snugly enough to hold it in place. We permanently chained the key to the side of the vise so it would not be lost.

Parts placed in the vise, resting against the key, can be machined with the assurance that they will come out square. It can easily be seen that on a long run job a lot of time can be saved, and on one or only a few parts it is a great convenience.

Arnold Koch, Milton, Ontario, Canada

Tool Tray Saves Many Steps



This tray was bent up from 1/16-in. sheet aluminum and a felt pad cemented to the bottom. About half of the tray is filled with a hard wood block which is drilled with a series of holes to hold a variety of small tools. Some of the tools I keep here are: a small drill chuck, a countersink, center drills, taps, end mills, and hexagonal key wrenches.

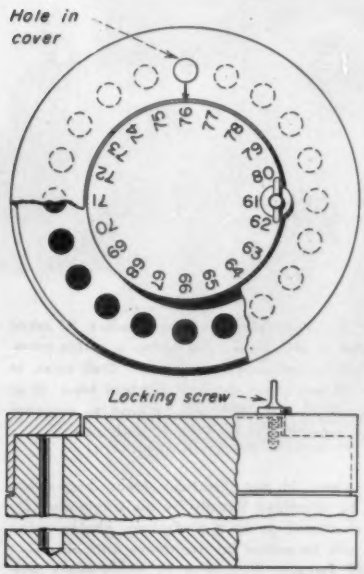
Two basins are routed out of the block to hold lathe cutting tools. Space is provided in one corner of the tray for a drill-bit case. The remaining space is used to safely hold micrometers, scales, depth-micrometers, and other instruments.

It is easy to appreciate the advantages this tray has over repeated trips to the tool-chest for tools that were forgotten.

Glen E Price, Caney, Kansas

Indexing Holder Guards Small Drills

The easily constructed case shown features an indexing method which permits a desired drill to be independently extracted. This case is designed to accommodate drills from No. 61 to No. 80. Protection against damage to cutting edges and delicate shanks is thus provided. At least three drills of each



size, depending on their diameters, can be kept in each receptacle.

The body of the drill case is made from a piece of 2-in. dia aluminum. It is turned to form a boss on the top face and to recess the edge of the cover. Drilling the receptacles is best done with the body chucked in a dividing head to insure accurate spacing.

Twenty holes of ⅛-in. dia are drilled in a 1½-in. circle, slightly deeper than the length of a standard No. 61 drill. The drill sizes are then stamped on the face of the boss near the edge, except in one location where a hole is drilled and tapped for a lock screw.

The cover is bored to a sliding fit over the body. The thickness of the top should be a couple of thousandths more than the boss-height of the body. This is to provide a grip on the cover for the locking screw. One ⅜-in. hole is drilled in the cover on a 1½-in. dia matching the circle of receptacles in the body.

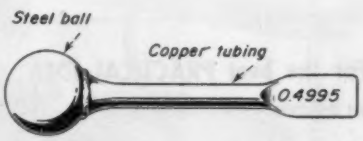
To remove a specific drill from the case, simply turn the cover to the size indicated on the boss, tilting the case will permit the drill to drop out while all others are retained. When not in use, the hole in the cover is positioned between receptacles and cover locked.

Joseph Ferran, Jackson Heights, NY

Steel Balls Makes Good Plug Gage

We make our own plug gages to precision check small reamed or honed holes. The advantage of the ball gage over the conventional pin-type plug gage is that the ball will enter a hole easier than a pin. A ball gage will also permit checking at any point in a hole.

The gage is made by slightly flaring one end of a piece of copper tubing. To this end a bearing ball of the required dia is soldered. The ball can be cleaned up by chucking the copper tubing in the lathe and spinning the ball with light pressure from a piece of fine abrasive cloth. This will remove scale



and flux deposited in soldering.

In a hole where a pressed fit is required, an undersized ball should be used. If none is available a standard ball can be made undersized by polishing with fairly course abrasive cloth.

When the desired size has been arrived at, the other end of the tubing is flattened and trimmed. The size of the ball is then stamped on the flat.

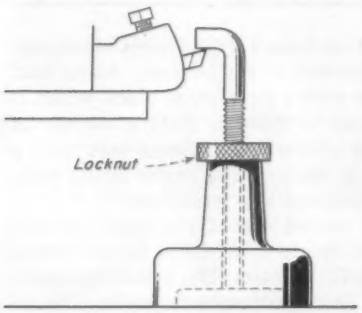
Harry J. Miller, Sarasota, Fla.

Soldering Gun Demagnetizes Small Tools

Unwanted magnetism in a small tool can easily be removed by inserting the tool in the loop of a quick-heat soldering gun.

To do this, simply pull the trigger switch while the tool is in the loop. Slowly withdrawing the tool will demagnetize it.

Henry Joseph, Gardenville. Penna



Gage Sets Toolbit Height

In almost every kind of turning, the exact height of the toolbit is of utmost importance. This is particularly true in thread cutting, taper turning, and in facing. The operator should therefore check the toolbit height upon replacing it in the holder after each regrinding or redressing.

To make this setting possible, I have made an adjustable gage that can be placed on the carriage of the lathe. Its base is essentially that of a small screw jack. It takes a machine screw that is bent at the upper end to form a hook. A knurled locknut secures the screw at any desired height.

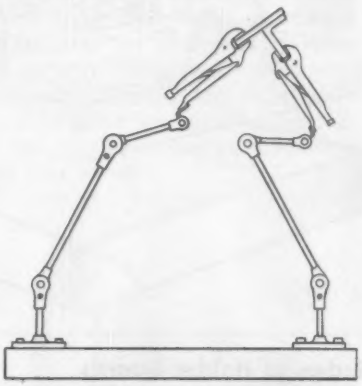
Should your lathe not have a flat surface on the cross-slide apron, the gage, with some modification, can be used on the compound. It can also be made higher and used on the lathe bed.

Federico Strasser, Santiago, Chile

Wrenches Hold Parts For Easy Welding

To save the expense of innumerable fixtures for the variety of welding we do, an adjustable rig was made as illustrated. This allows welding small parts at any angle. We salvaged two discarded heavy swivel - joint shop light stands. The light sockets and shades were removed and replaced by adjustable lever-jaw wrenches welded to the first ball joint.

The stands were bolted to the welding table, adequately spaced to permit the table to be used for other work. Stands were used at their original length, providing a comfortable height to work standing up without stooping. The height, however, can be altered to suit the particular needs by sawing off the tubes as desired and relocating the sockets. It's a real time saver when small parts must be joined.



R B Courtney, Whittier, Calif

For the best PRACTICAL IDEA

IN THE DECEMBER 17, 1956 ISSUE

Winner No. 265 Received $25 IN ADDITION TO REGULAR PAYMENT

- **D G Nolle,** Montreal, Canada **'Bolt Circle Scriber'**

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for the best Practical Idea published between Production Planbook issues . . .

Every contributor to Practical Ideas will now be eligible for two prizes; the regular $25.00 prize awarded for each issue, and a second Grand Prize of $100.00 to be awarded to the author of the Practical Idea judged the best in each Production Planbook. Planbook Practical Ideas are reprints of all the $25.00 winners published through the year; thus the winner of the Grand Prize will be a winner of winners. Rules for the Grand Prize contest will be the same as for the contest in each issue, except that the ideas considered must qualify by winning the $25.00 prize in the issue in which they originally appeared. Duplicate prizes will be awarded in case of a tie vote. Reader vote will be considered final.

An extra payment of $25 is made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

PAYMENT — $25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received — usually three to four weeks after the date of issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES — A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in a tie, $25 will be paid to each co-winner. Decision of the readers will be final in each case.

REQUIREMENTS — Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author — every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product — in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co, Inc, and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

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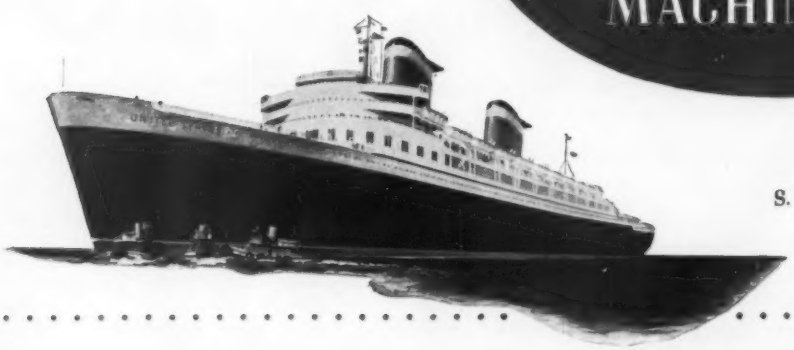
RED RING HORIZONTAL SHAVING MACHINES



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Tolerances and Limits . . X

Appendix

True Position—Continued

For a group of holes shown in Fig 43, the size and location of the tolerance zone for datum *A* is established by the tolerances on the rectangular coordinates locating datum *A*. The size of the tolerance zones for the other holes derives from the tolerances of the coordinates from hole to hole. The positions of these square zones vary as the datum-hole location varies.

Fig 44 illustrates two of the many zone patterns: (*a*) where the datum hole is located at its theoretically correct position; and (*b*) where the datum hole is located at the extreme upper right-hand corner of the tolerance zone.

As another example, a common specification for holes around a bolt circle, positioned with respect to a slot, is shown in Fig 45. Polar coordinates are given, consisting of angular dimensions and a toleranced bolt circle. The interpretation of these dimensions means that the center of each hole will lie within an annular sector, 0.010 by 2° as shown in Fig 46.

These tolerancing methods make it difficult to determine whether given parts made to these tolerances will mate satisfactorily with their corresponding parts, even though they are within the stated tolerances.

The engineering intent can often be expressed more simply and precisely if locations are given as true positions with tolerances to state how far actual positions may be displaced from true positions.

To avoid misinterpretation, true position is always established with reference to a datum. However, for simple arrangements, the datum may be inferred, and need not be identified.

In true-position dimensioning, the basic location of the feature concerned is given by the use of untoleranced locating dimensions in any suitable form, and a note specifying the positional tolerance for that feature.

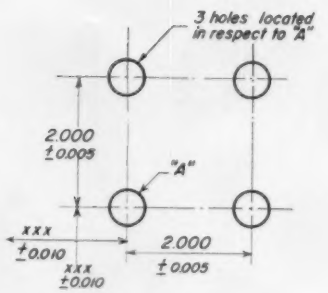


FIG 43

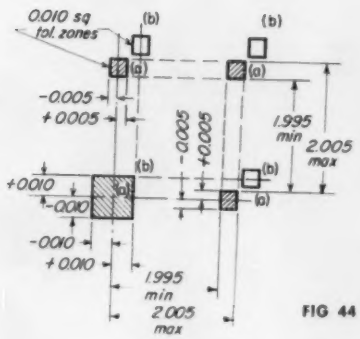


FIG 44

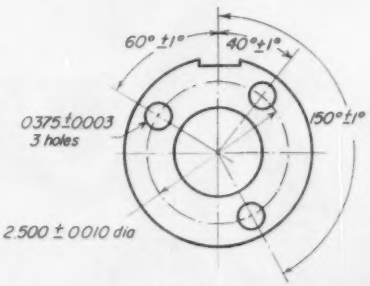


FIG 45

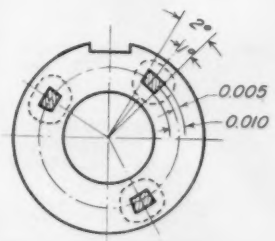
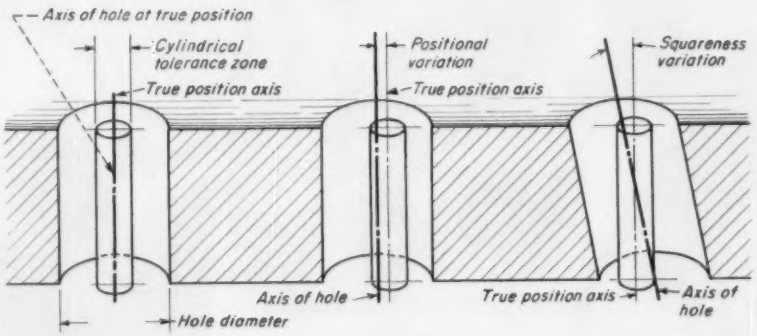


FIG 46



(A) Axis of hole is coincident with true position axis

(B) Axis of hole is to the left of true position axis but within tolerance zone

(C) Axis of hole is inclined to max position within tolerance zone

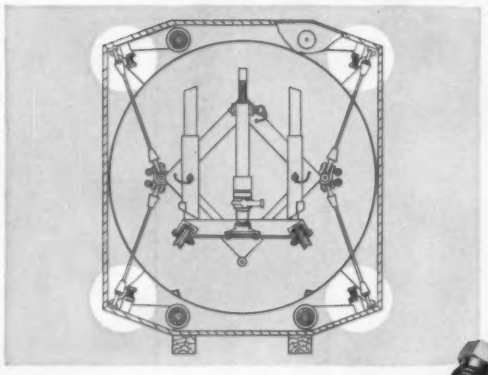
FIG 47

A complete true-position expression consists of two, or three, parts. First, the basic locating dimensions are given with some indication that general drawing tolerances do not apply. Second, expressions such as "LOCATED AT TRUE POSITION WITHIN .XXX DIA" or "LOCATED WITHIN. XXX R OF TRUE POSITION" are added to the note concerning the feature to be located. See Fig 48. And third, if necessary, a phrase identifying the datum is added.

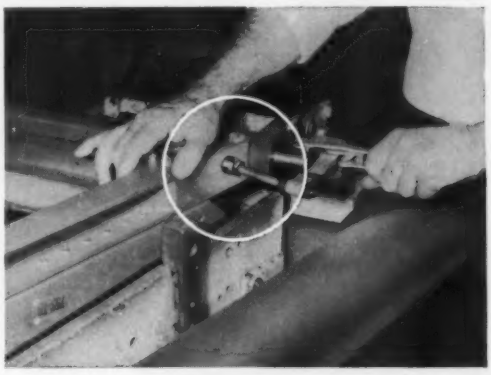
Fig 47 illustrates the relationship of the axis of an actual hole and the true position tolerance zone. In terms of the axis of the hole, it means that the axis of each hole at

TOOLING IDEAS your shop can use!

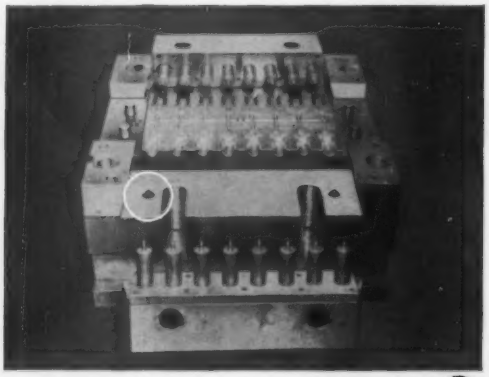
Shown below are just a few of the many uses for Vlier tooling accessories. Although these standard accessories are primarily used in jigs and fixtures, many companies are using them to replace custom-made devices in original equipment.



SPECIAL SWIVEL-PAD CLAMPS for a missile container manufacturer incorporate the remarkable Vlier ball-joint construction. Eight Swivel-Pad Clamps are used to release tension on cables which suspend the missile in its shipping container. This particular model withstands 21,000 load pounds.



CLAMPING PARTS WITH OFF-ANGLE SURFACES is no problem when Vlier Toggle Pads are used with a toggle clamp as shown here. The pad swivels 10° each side of the center line, assuring solid clamping of the part with no damage to the surface.



THIS 16-CAVITY, SIDE-ACTION PLASTIC MOLD uses four Vlier S-66 Spring Plungers as *detents* to lock the side-action bar in its travel to the center of the mold, eliminating costly, custom-made detents formerly used.

New Head Design

on all Vlier Torque Thumb Screws protects working parts from dirt, chips, and other foreign matter. Truarc ring makes disassembly easy. In all Vlier Torque Thumb Screws the ball-check is perpendicular to the screw axis, preventing uneven wear and wobble.

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Tolerances and Limits . . XI

all sections along its length must fall within the specified cylindrical tolerance zone whose center is located at true position. It is important to note that this tolerance zone also defines the limits within which variations in the squareness of the axis of the hole must be confined with respect to the surface.

Where a part and its mating part have matching feature patterns, and alignment between such parts depends upon a functional feature such as a pilot, bore, or surface, this feature should be used as a datum. In such cases the location tolerance note reads "X HOLES LOCATED WITHIN .XXX R OF TRUE POSITION IN RELATION TO DATUM A," as in Fig 49, thus assuring proper alignment of features between the mating parts.

Appendix II
MEANING OF MMC AS RELATED TO POSITIONAL TOLERANCES

Maximum-material condition, usually abbreviated to MMC, is a phrase which is introduced in this standard.

Maximum-material condition by itself means that a feature of a finished product contains the maximum amount of material permitted by the toleranced size dimensions shown for that feature. Thus for holes, slots, and other internal features, maximum material is the condition when these features are at their minimum allowable sizes, and for pads, shafts, bosses, thicknesses, and other external features, maximum material is the condition when these features are at their maximum sizes permitted by the toleranced dimensions. As a general rule, tolerances of position are determined by the specified maximum material condition of mating features, and in many cases the limits of location must be observed regardless of the actual finished sizes of the features concerned. However, in other applications, the limits of center distance may be exceeded if the features are not on their maximum material limits of size, because of the increased clearance between the mating features. This, then, is the interpretation when the symbol MMC is used in conjunction with the location specification.

To carry on interchangeable production efficiently, precautions must be taken to make sure that parts can be freely assembled. Fixed gages, made to simulate mating features at dimensional limits that make assembly most critical, can be used to assure free and proper assembly, by simple and economical inspection methods.

Under some dimensioning systems, there has been a lack of adequate means to indicate proper tolerance conditions. For example:

Two ½-in. holes are specified on a drawing as shown in Fig 50.

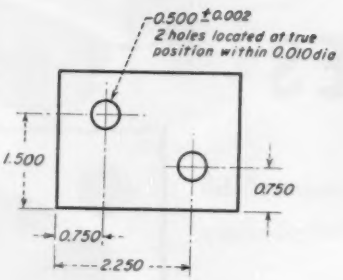


FIG 48

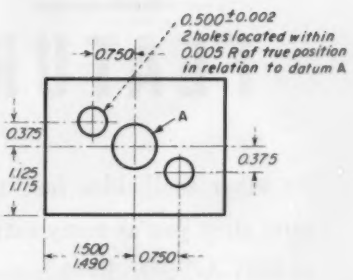


FIG 49

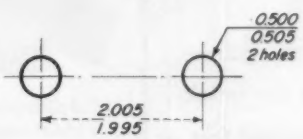


FIG 50

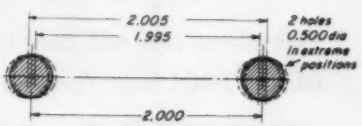
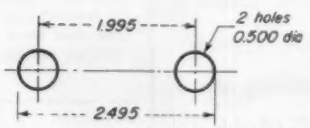


FIG 51



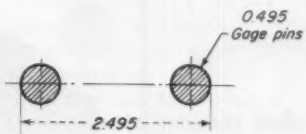
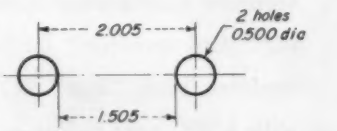


FIG 52



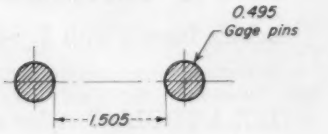


FIG 53

If the holes are exactly 0.500 in dia (the maximum-material condition, or the smallest size hole permitted by the drawing specification) and are centered exactly 2.000 apart, they will theoretically receive a gage consisting of two round pins fixed in a plate if the pins are centered 2.000 apart and are 0.500 in dia.

However, the limits specified on the drawing permit the center distance between the holes to be from 1.995 to 2.005. The pins in the gage would therefore have to be 0.005 smaller, or 0.495 diameter, to enter the holes in their extreme positions, as shown in Fig 51.

If the holes are exactly 0.500 in dia but located at the maximum permissible center distance, the 0.495-dia gage pins would contact the inner sides of the holes since the

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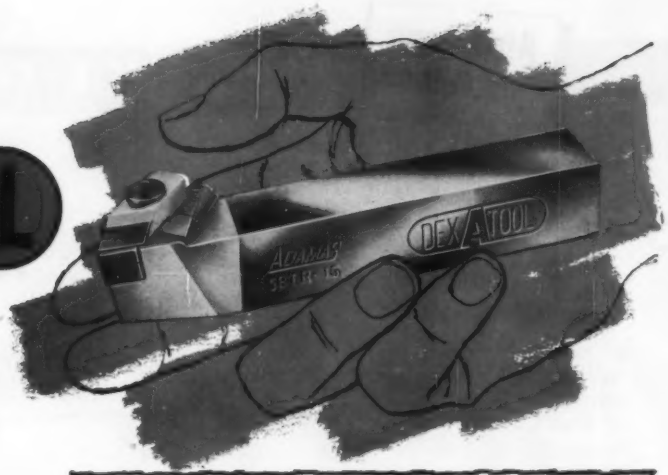

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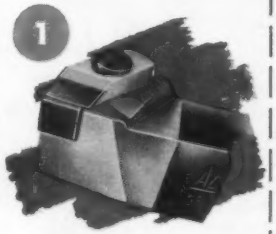
Talk about *fast* and *easy* to work with — DEX-A-TOOL's got them all beat for quick interchangeability, rapid indexing and fast, accurate chipbreaker location after indexing! And versatile? DEX-A-TOOL accommodates both "thin" (1/8") cutting tips with 1/32" nose radius *or* "thick" (3/16") carbide inserts with 3/64" nose radius!

DEX-A-TOOL's 7 styles and 56 sizes cover the full range of machining conditions! DEX-A-TOOL's precision engineering and many plus features add up to real trouble-free machining! Plan *today* to test DEX-A-TOOL on your own machines.

1



Adjustable chipbreaker

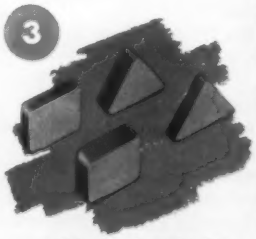
Combination chipbreaker clamp is easily adjustible for lightest to heaviest cuts . . . eliminates the need for a separate chipbreaker for varying feeds.

2

Invertible anvil

Invertible feature doubles life over other anvils . . . gives up to *8 times* the life over anvils which are not indexable and twice the life over anvils which are not invertible . . . copper plated, hardened tool steel or carbide.

3



Holds both "thick" and "thin" inserts

"Thick" and "thin" anvils accommodate 1/8" or 3/16" inserts of either carbide or Ceralox (Adamas ceramic cutting tool material).

4

Chipbreaker setscrew

Provides fast, precision relocation of chipbreaker.

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Tolerances and Limits . . XII

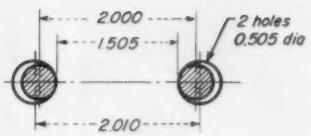


FIG 54

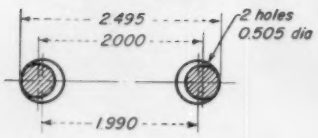


FIG 55

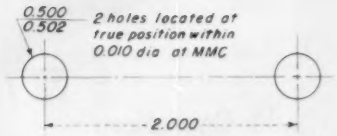


FIG 56

distance between the inner sides of the gage pins is 1.505, Fig 52.

Now if the holes are exactly 0.500 in dia but located at the minimum permissible center distance, the gage pins would contact the outer sides of the holes, if the distance between the outer sides of the gage pins is 2.495, Fig 53. Neglecting gagemaker's tolerances, the gage pins would have to be 0.495 in dia and the centers located exactly 2.000 apart. Thus, the holes in the part, if they are 0.500 in size, will fit the gage pins if located within the limit locations specified.

Now, if the holes are at maximum size, 0.505 dia, permitted by the drawing specifications, they will be accepted by the gage if the inner sides of the holes contact the inner sides of the gage pins, which means that the holes will have a center distance of 2.010, which is outside the center distance limits specified. See Fig 54. These holes will also be accepted by the gage when their outer sides contact the outer sides of the gage pins, or a center distance of 1.990. See Fig 55. This is again outside the center-distance limits specified on the drawing.

When this condition is acceptable, the product drawing should be dimensioned as in Fig 56.

It is desirable to have a generally accepted method of indicating on the toleranced center distances that the limits of center distance must be observed only if the features are in their maximum material limits of size, but may be exceeded when the features are finished away from their maximum-material limits in the direction of minimum material. This tentative standard introduces such a method.

Fig 57 illustrates the additional positional tolerance permissible at minimum-material condition when positional tolerances apply only at maximum-material condition for a single hole located from a datum.

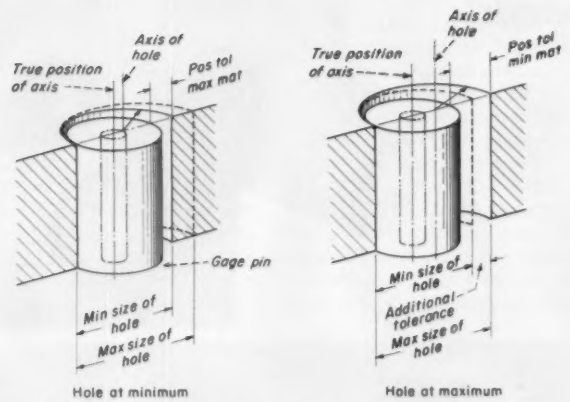


FIG 57

Experience has indicated that in all but a few exceptional designs, this additional tolerance is acceptable and desirable. It permits the acceptance of parts which can be freely assembled whether or not the holes or other features are located within the specified positional tolerance. It will be noted that when a hole is larger than its minimum diameter, the total positional tolerance may be exceeded by an amount equal to the difference between the specified minimum size and the actual size on a specific part. If a particular hole in an actual part is at minimum diameter, the difference is zero, and so the actual location of that hole must be within the positional tolerance stated on the drawing.

But the practice should not be applied indiscriminately. Its prime purpose should be to facilitate manufacture by permitting inspectors to accept parts that will assemble and function properly but that may otherwise be rejected because the positional tolerances specified on the drawing have been exceeded. The specification on a drawing providing for the additional tolerance indicates definitely that the designer has considered the problems involved, and approved certain deviations larger than the positional tolerances stated. This prevents uncertainty about the intended meaning in any particular situation, and avoids confusion which might be caused by allowing deviations outside the stated limits without specifying which dimensions might so deviate.

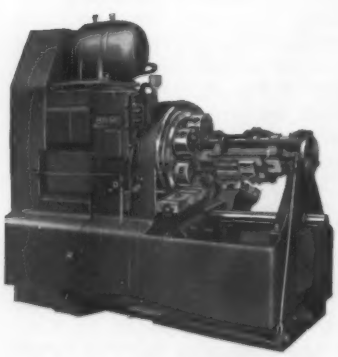
Where maximum material condition is not used the true position tolerance may be made to apply regardless of feature size, and may be emphasized by adding a phrase such as the following to the drawing note:

1. 6 HOLES LOCATED AT TRUE POSITION WITHIN 0.010 DIA REGARDLESS OF HOLE SIZE.
2. 6 HOLES LOCATED WITHIN 0.005 R OF TRUE POSITION REGARDLESS OF HOLE SIZE.

...ask BAIRD about it

Tooling like this on a BAIRD 76H CHUCKER

can change *your* whole cost picture too . . .



industry's most versatile high production chuckers

To drop from dollars to cents in the unit cost of machining a workpiece is not unusual on a Baird installation. The secret lies in the basic design of this unusual work-rotating machine which permits practical "bug-free" tooling for an almost unlimited range of operations . . . and is equipped for single-cycle or double-indexing, with manual or auto load, auto eject, or full automation as may be required.

On the job illustrated above . . . die cast aluminum starting motor end plates . . . a feature is that only the first two of the six spindles revolve, at which time both sides of the flange are faced, both locating diameters turned, the center hole rough-bored, faced and chamfered, and inside hub back-faced and chamfered. The remaining stations, #3, #4 and #5, are stopped and accurately positioned while powered tools mounted on the tool slides finish-bore the center hole, tap two 1/4-20 holes, and bore one .313-.315 diameter hole off-center.

Sequence of Operations: Face both sides of .421 - .425 flange, turn and chamfer 4.087 - 4.083 and 3.868 diameters, rough and finish-bore .8115 - .8130 center hole, back-face and chamfer inside hub (recessing head), face and chamfer outer hub, tap two ¼-20 holes, and bore one .313 - .315 diameter hole.

Production: Cycle time 8.55 seconds per piece, 421 pieces per hour gross.

Why not put your high-volume, high-precision jobs on Baird 76H Chuckers? Even where volume is not the whole story, rapid-tooling change-over makes it a most profitable investment. Estimates and recommendations will be given on your prints or samples. Write Dept. AM.

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THE BAIRD MACHINE COMPANY
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9BA56

Talking Shop . . .

Obsolete Brains?

SOME comment on the implications of automation has reached us from the Royal Bank of Canada. Much of it plows familiar terrain to those who followed the developments of recent years, but we were struck by the wisdom of one paragraph: "It is no disgrace even to the wise to learn and lend an ear to reason. Automation will separate the men from the boys, for example in decision making. Facts will be more quickly available than they are now, and the advantage in business will go to the executive who has assured himself of getting them completely, and who has acquired the ability to analyze them logically and to act on them speedily. . . . Automation is here, and no one with a sense of history and destiny would wish to arrest a movement that promises to increase the world's goods and reduce human drudgery."

APT is the word for it

MIT's SERVOMECHANISMS Laboratory is studying the possibilities of using a general-purpose digital computer for automatically programming numerically controlled machine tools. Effort is concentrated on determining the basic principles involved in combining a machine-tool, a human, and a computer into a system which is both flexible and efficient. Initial stages of an APT system (Automatic Programmed Tool system) have been developed which embody a simulated APT computer which can be programmed by curves and regions, rather than point-to-point as at present. In the near future an Englishlike language will be developed for convenience in expressing designs in terms of curves and regions. This will fulfill the objective of the APT system and, it is felt, will possess sufficient growth potential to be readily applicable to most industrial machining problems.

A future phase of the APT system suggests a machine-computer combination which is fed only the physical requirements of a component. The device will specify the type and size of material required then, when this material is introduced, it will complete the part to the proper dimensions and within the necessary tolerances.

Early Screw Caps

IN 1548, the manager of a pottery in Italy reported a technique for making screw-stoppers of tin, according to The Tin Research Institute. The threads of the screw and those in the socket were first formed as parallel squaresection ridges on a substantial tin base of about the same thickness. A collar of this ridged material was bent around a mandrel and then pulled out of alignment by one pitch to form a helical internal thread. The butted edges were then soldered together. The stopper was formed by wrapping the material over a mandrel with the ridges on the outside. The method, reported more than four centuries ago, was ingenious and practical. In fact the latest edition of the book was published in 1879.

New Superalloys

LOOKING for a forgeable alloy suitable for high-temperature use, the Air Force has been experimenting with one that is 70 parts chromium, 30 iron, 9 molybdenum, 2 to 3 titanium, and ½ aluminum. Experimental induction-melted charges are reported to have good thermal shock properties up to 2000 F.

Meantime, the Tungsten Institute reports that a tungsten-base alloy developed at Stanford is now being tested for use in vanes.

All the research isn't for air use, however. At Ohio State, a new cast stainless has been developed for valves, pumps, and other parts requiring extreme corrosion resistance over a long period of time. The alloy has 25 to 27% chromium, 4.7 to 6.00% nickel, 1.75 to 2.25% molybdenum, and 2.75 to 3.25% copper. Developed for the Alloy Casting Institute, the new alloy is designated type CD-4M Cu.

Synthetic Lightning Bug

A SERIOUS defect of the phosphorescent numbers on the dial of your wristwatch is that their glow-power is determined by exposure to light. No periodic recharging by sunlight, no glow in the middle of the night. The Air Force has found a solution to this problem and will shortly equip B-52 escape hatches with buttons that glow in the dark for more than five years. The light source is a small piece of Strontium-90, sealed in transparent plastic. In night emergencies the buttons will guide crewmen to the escape hatches. The Atomic Energy Commission has licensed the Surgeon's Office at the Air Materiel Command to handle the buttons. Other uses may be expected to develop for this relatively permanent light source, but the B-52's will get all the buttons at first.

Buyer's Friend

FOR years we've needed a good source of information on who makes what for Metalworking. Judging from some of the requests for information that we receive, this is a problem that we share with a lot of our readers. It was last year that we decided to do something about it and developed from scratch a new Buyer's Guide designed specifically to meet the needs of Metalworking. We find it so useful ourselves, that we wonder how we got along without it. So if you'll forgive us for a little plug in this department, we'll remind you that our 1957 Planbook Issue, which includes this Buyer's Guide, should now be at your elbow for a quick answer to many questions. Is it?

Can We Standardize Machine

"WHY NOT? They did it on presses" say automakers . . .

DETROIT—Recent adoption of JIC standards for top-drive mechanical presses is causing automobile builders to ask "why can't elements of metal-cutting machine tools be standardized, too?"

They point out that standards have long been established for milling machine arbors, grinding wheel dimensions, lathe spindles and similar elements of machine tools—with substantial gains for the users. A chuck, for example, can be transferred from one lathe to another of a different make; milling cutters on one arbor can be installed on some other make of machine; and grinding wheels of various makes fit standard arbors. This interchangeability saves users of machine tools time and much money in inventories of small tools, adapters, etc.

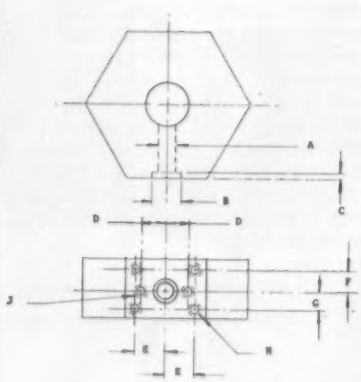
Now the automobile people are saying, "why not go the rest of the way?" Milling machine tables on comparable models still vary from one manufacturer to another as far as widths and number and size of T-slots are concerned. Although grinding wheels will fit various arbors, their mounts have a variety of tapers, some differing as little as 5 or 6°. Tools from one turret lathe cannot conveniently be used in the turret of another, even though other elements of the same machines permit interchangeability.

Although mounting elements of electrical motors have been standardized for years, nothing definite has been done toward standardizing hydraulic and pneumatic cylinder mounts. In many cases, differences in mounting pads make it necessary for users to buy cylinders on the basis of how adaptable they are to installations—rather than on their usefulness.

Many of these standards have been eased for users of presses by the recent standardization program, Detroiters declare. Presses on which JIC standards have been adopted by users and builders include:

- Triple action, multiple point, straight side.
- Double action, single and multiple point, straight side.
- Single action, single and multiple point, straight side.
- Open-back stationary.
- Open-back inclinable.
- Adjustable knee.

SPACING AND SIZE OF T-SLOTS in various makes and types of milling machine tables vary sufficiently to make adapters or special fixtures necessary. This table illustrates the slight table-dimension differences in seven leading makes:



DIMENSIONS (see drawing at left)

Mfr	A	B	C	D	E	F	G	H	J
A	1	1 7/8	1/8	1 7/8	None	None	None	None	7/16–14
B	1 1/4	1 5/8	9/64	None	1 5/16	1 1/16	1 1/16	7/64–14	None
A	1 1/2	1 3/8	1/8	1 7/8	1 5/8	1 3/8	1	1/2–13	7/16–14
C	1 1/2	1 7/8	5/32	None	1 5/8	1 3/8	1	1/2–13	None
A	1 1/2	1 7/8	1/8	None	1 5/8	1 3/8	1	1/2–13	None
C	1 1/2	1 7/8	5/32	None	1 5/8	1 3/8	1	1/2–13	None
D	1 1/2	2	9/32	None	1 5/8	1 3/8	1	1/2–13	None
D	1 1/2	2	9/32	None	1 5/8	1 3/8	1	1/2–13	None
B	1 1/2	1 7/8	9/64	None	1 11/16	3/4	3/4	7/16–14	None
E	1 1/2	None	None	None	1 3/4	1 1/4	1 1/4	1/2–13	None
A	1 3/4	2 5/8	1/8	None	1 3/4	1 1/2	1 1/4	1/2–13	None
C	1 3/4	2 5/8	5/32	None	1 3/4	1 1/2	1 1/4	1/2–13	None
B	1 3/4	2 1/4	9/64	None	1 15/16	1 3/8	1	1/2–13	None
B	2	2 1/2	3/16	None	2 3/8	1 1/2	1 1/2	1/2–13	None
E	2	None	None	None	1 1/2	2 3/8	2 3/8	1/2–13	None
D	2 5/8	3 1/8	9/32	None	2 1/8	1 3/4	1 1/4	5/8–11	None

Tool Elements?

Standardized elements include: number, size and spacing of mounting slots, T-slots, pressure-pin holes, bolster plate dimensions, bed opening, shut height, length of gibs, electrical components.

The advantages: reduction of setup time, simplification of press maintenance and die design, and a high degree of interchangeability. The latter can be tremendously important in emergencies when it may be necessary to move presses or tools from one plant to another. In such cases, press standardization insures die installation in different presses without time-consuming modifications to the presses or to the tools.

Moreover, the inherent accuracy of the press is not lost through shimming or the addition of tool blocks and other devices to make dies fit—and safety is increased by eliminating the need for such fittings.

Standardization of tool mounting spaces on plastic injection molding machines has been done to such an extent that molds from one machine can be mounted on another. The same thing could be done—but hasn't yet—for die-casting machines. The advantages to be gained by interchangeabiltiy are obvious.

"It's possible, BUT . . ." say machine tool builders

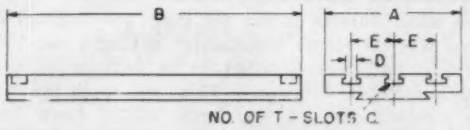
NEW YORK—Most machine tool builders agree with the aims of the automobile builders to standardize machine-tool elements. This fact, which may surprise some auto executives, is revealed by a special survey of the attitudes of builders just completed by *American Machinist*.

There are several strong reservations, however. The principal ones:

- We may merely replace standards set by builders with standards set by individual customers.
- Too much standardization will stifle development.
- Changes in existing builder standards will work a hardship on owners of existing machines.
- Standards could put a crimp in competition.

Is JIC a Standard?

Key executives of two major builders bluntly charged that some automobile builders do not follow the JIC Standards they have developed. One said, "Our experience is that many major customers, including those who were active in creating the JIC Standards, have used them merely as a springboard for their own private standards which, in very many cases, are more rigid and stringent than the official standards themselves. To be of real value, standards must be acceptable to both manufacturers and users with the result that few exceptions will be requested. This has not been our experience with the standards thus far."



ONLY THESE SLIGHT DIFFERENCES in tool mounting dimensions of ram-type turrets prevent interchangeability between various makes. Dimensions shown here are those used by five leading makers for faces of turrets:

Make	Type	A	B	C	D	E
A	R	22	—	3	1 3/16	5
A	R	22	—	3	1 3/16	5
A	R	22	—	3	1 3/16	5
B	R	14	78	3	1 3/16	5
B	R	14	102	3	1 3/16	5
B	R	18	78	3	1 3/16	5
B	R	18	102	3	1 3/16	5
B	R	18	126	3	1 3/16	5
B	R	18	155	3	1 3/16	5
C	HK	20	94 1/2	3	1 3/16	4 1/4
C	HK	20	104 1/2	3	1 3/16	4 1/4
A	PUV	20	86 1/2	3	1 3/16	4 1/4
A	PUV	20	94 1/2	3	1 3/16	4 1/4
A	PUV	20	104 1/2	3	1 3/16	4 1/4
A	PUV	18	—	3	1 3/16	3 3/4
A	PUV	18	—	3	1 3/16	3 3/4
C	P	11	55	3	1 1/16	3 3/4
D	H	18	90	3	1 3/16	3 1/2
D	H	18	98	3	1 3/16	3 1/2
D	H	18	108	3	1 3/16	3 1/2
D	U	18	90	3	1 3/16	3 1/2
D	U	18	90	3	1 3/16	3 1/2
D	V	15 1/2	74	3	1 3/16	3 1/2
D	V	18	90	3	1 3/16	3 1/2
D	V	18	98	3	1 3/16	3 1/2
D	V	18	108	3	1 3/16	3 1/2
D	P	15 1/2	80	3	1 3/16	3 1/2
D	P	18	96	3	1 3/16	3 1/2
D	P	18	106	3	1 3/16	3 1/2
D	R	12	42	3	1 1/16	3 1/2
D	R	18	42	5	1 1/16	3 1/2
C	PUV	15 1/4	68 1/2	3	1 3/16	3 1/4
C	PUV	16 1/4	79 3/4	3	1 3/16	3 1/4
A	PUV	18	72	3	1 3/16	3 1/4
B	R	14	78	3	1 3/16	3 1/4
B	R	14	102	3	1 3/16	3 1/4
E	All	12	56	3	1 1/16	2 3/4
E	All	14	62	3	1 1/16	2 3/4
D	V	13 1/2	56	3	1 1/16	2 3/4
D	V	15 1/2	64	3	1 1/16	2 3/4
D	PV	14	62	3	1 1/16	2 3/4
D	PV	14	68	3	1 1/16	2 3/4
D	PV	15 1/2	72	3	1 1/16	2 3/4
F	PU	10	42	3	1 1/16	2 1/8
F	PU	10	45	3	1 1/16	2 1/8
F	PU	11 1/2	57	3	1 1/16	2 1/8
G	U	12	52	3	1 1/16	2 1/2
H	PU	10	45	3	1 1/16	2 1/2
G	PV	12 1/4	58 1/2	3	1 1/16	2 5/16
D	V	12	50	3	1 1/16	2 1/2

KEY TO TYPES: R = rigid. HK = horizontal knee. P = plain. U = upright. V = vertical. H = horizontal.

STANDARDIZE MACHINE TOOLS? (continued)

The other builder points out that "the original objective was universal standards," but now we have individual variations insisted on by various divisions of the automobile companies. This "results in the complete obsolescence of standards which have been evolved in certain builders' plants and substitutes in its place a great variety of standards, each one applicable to a different customer and with no two customers alike."

Standards Dictatorship?

Another danger cited by another major builder is that one group is dictating standards for the auto industry, while a different group has a different standard for the aircraft industry. If this goes too far, this spokesman concludes, "the machine tool builder will have to build his product not as a standard product but one to suit various groups in industry that have their own peculiar ideas of what the standards should be."

Stagnant Standards?

One group of machine tool builders expressed approval of the aims to standardize machine-tool elements with one major reservation. Typical of this group was the president of a company noted for leadership in improving its models. He said, "Standardization within certain limits can be very beneficial for users of machine tools, but if the thought of economy of interchangeable tooling is carried too far it works to the detriment of the customer. In order to make continuous progress, we must be careful not to interfere with the ingenuity of designers by too much standardization, or we will stagnate improvements."

"Any strict set of standards has the tendency to restrict developments in machine tools," says the general manager of another major builder. He feels that this conflict will always be resolved in favor of the improvements. "On the surface, it looks feasible to build up a set of building blocks which will do practically any machining operation and remain in conformation to a predetermined standard. A natural practice which most machine tool designers find necessary for the ultimate in performance is a departure from the standards in enough instances to bring many of the units into nonconformance with the standard. It has been our experience in such instances that the customer, in most cases, prefers the improved performance over the adherence to a standard."

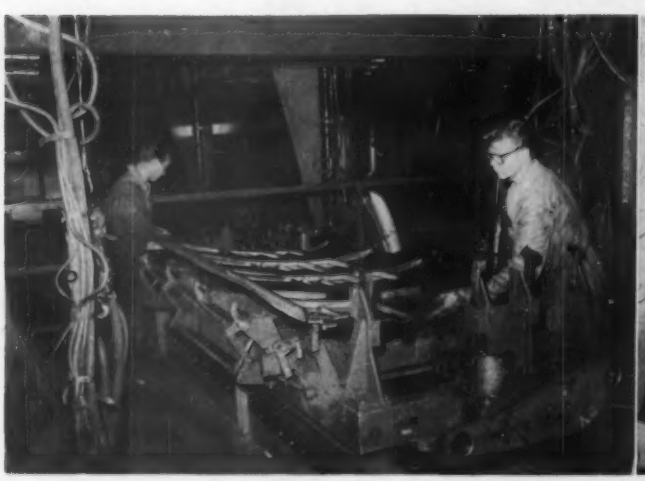
Grinding-wheel Mounts

Sizes of grinding wheels have been standardized for many years, but in suggesting that this be extended to the grinding-wheel mounts the auto builders struck a nerve. Efforts to improve accuracy and finish of ground surfaces center in the grinding spindle. The design of the mount has always been considered secondary to the spindle design, but must necessarily change with it, especially if automatic balancing is involved.

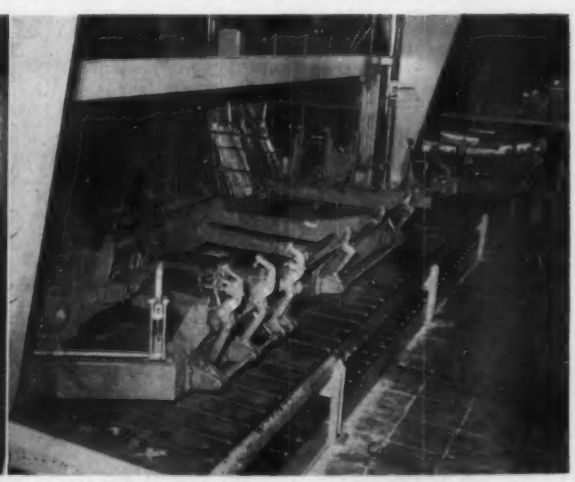
"Let the Builder Work It Out"

Builders of grinding machines that commented on this point were unanimous in their belief that design of wheel mounts should be left to the individual builders. Any attempt to insist on a standard for wheel mounts, they felt, would stifle development in grinding. In contrast, several builders who do not make grinding machines felt that much could be gained by the standardizing of wheel mounts.

Assembly Fixture Takes a Long Ride



1 . . . Assembly fixture performs two functions in making Volkswagen delivery vans: (1) supporting and locating details of side-panel subassembly, and (2) forming part of the main body-assembly fixture



2 . . . Basic side panel with stiffeners is installed in fixture and held down with toggle clamps. As the conveyor moves forward, additional parts are spotwelded in to complete the delivery van body assembly

Another group of builders expressed approval of the aims but with a reservation because of the large number of their machines now in use.

"The major bone of contention," said one, "has always been that a standard machine tool builder has many machines in the field and, if he changes his standards now, the great portion of attachments and tooling that a customer has will be obsolete and unusable on new equipment."

The spokesman for another major builder said that any work toward standardization will result in an overall gain to the builder, tool supplier, and user. He feels, however, that "the user who has a considerable investment in tooling to fit existing machines may offer resistance since he might not be able to use it on the new model. Such conditions will arise; however, the gain over a long period will far out-weigh the disadvantages."

Builders as Users

It is sometimes forgotten that machine tool builders are also users of machine tools. One major builder cited its own experience: "Many times we have designed a milling machine fixture for a particular machine only to find that when it was required, it was necessary to install the fixture on another machine and then it was found that the keys needed to be changed, or we had to clamp the fixture down with straps because the bolt holes or slots did not match. The same situation applies to radial drills and other machines using a table."

This company feels differently about turret lathes—and it does not manufacture them. "Practically all of the tooling is procured from the original manufacturers who, over the years, have endeavored to design their tooling to suit the models they make, and have, therefore, eliminated to a large degree the necessity of design or procurement from outside tool shops. Any attempt to standardize would obsolete all the tooling previously designed and stocked and would require duplications in each of the manufacturers' plants.

The Basic Urge

Finally, competition rears its healthy head among the machine tool builders, just as it does among the builders of automobiles.

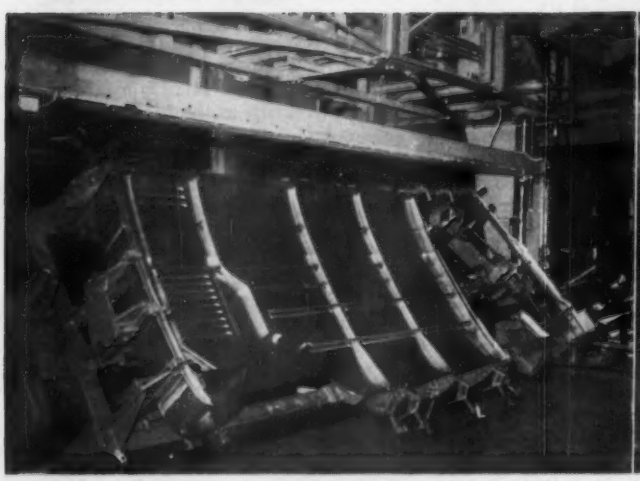
On this point, one said, "It is my opinion that we all feel our designs are just a little bit better than our competitors' and any effort on the part of the automobile manufacturers to standardize elements would certainly meet strong opposition."

Destroyer of Competition?

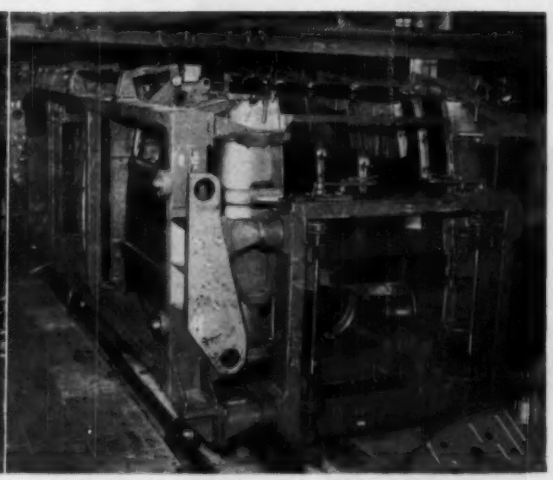
Another put it this way: "Standardization carried to its ultimate could mean the destruction of competition. All of us in the machine tool business believe that our products have certain features of great importance to the customer. These features are our salesmen's talking points. . . . While we recognize the tremendous advantage of standardization and would be glad to cooperate in any such move, we still believe in individual initiative not only for the good of our own company but also to improve the well-being of business as a whole."

The last word in this controversy should undoubtedly go to the gentleman who said, "as you know the demands of our customers can be much more real than a lot of competitive theorizing."

at Volkswagen's New Hanover Body Plant

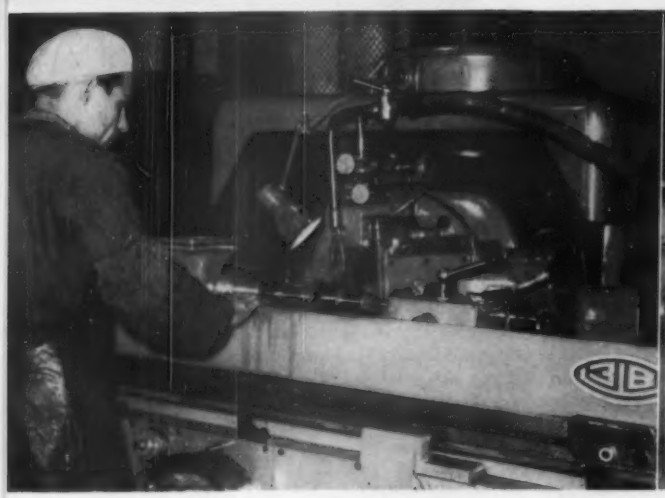


3 . . . Side panel stays in its own fixture, even when positioned on main body assembly. Here, a hand-over device lifts panel and fixture from slat conveyor, shifts them to vertical position, and moves them to the adjacent body-assembly line



4 . . . Left and right side panels and chassis are shown here being positioned on the body assembly dolly. Two lugs at rear and one at the front of each side insure accurate alignment

FOREIGN REPORT . . . No. 7 on Russia



1 . . . Moscow thread grinder at work on worm for pump

2 . . . Moscow slideway grinder

An Inside Look at Two Russian

An eyewitness report by
Peter Trippe
London Staff Editor

MOSCOW — Grinding machine plants, like all other major Russian machine tool factories, play a dual production role—turning out special grinding machines as well as standard ones. Two notable examples of this are the Ilyich grinding machine factory in Leningrad, which is planning to automate soon, and the Moscow grinding machine plant, which today turns out some 70 different types of machines and will take on manufacture of specials ranging from gear grinders to special machines for automatic grinding of plowshares.

The first of these, the Ilyich plant at Leningrad, is noted in Russia for its production of special machines, including the grinders for the Moscow automatic bearing plant (*AM*—Jan 14 '57, p147).

Ready for Automation

Dating back to the 1930's, insofar as output of grinding machines goes, Ilyich has its standard production lines laid out in such a way that they can easily be conveyorized and automated. In fact, Ilyich today is high on the list of Russian machine tool plants slated for automation.

Following World War II, all of Ilyich's old machine tools were replaced and production was modernized so that the plant's prewar grinding machines, too, could be completely revamped. By 1948, Ilyich was building a number of special automatic grinding machines in addition to its regular output of cylindrical, ball-race, gear hob, saw, tool and cutter, and flexible grinders. High-frequency spindles made their first appearances in 1949 on an internal grinder for small bearing races, so did the first optical profile grinder.

Two new universal grinders were introduced into the standard product line in 1951, one for full taper grinding, and the other a machine that could produce tapers only to within limited ranges. Also made in 1951 was an automotive grinder for external grinding of radiused form on ceramic rings, which included automatic diamond dressing.

By 1955 Ilyich's universal grinder had evolved to the present model, which incorporates a special method spindle balancing and variable speed drives.

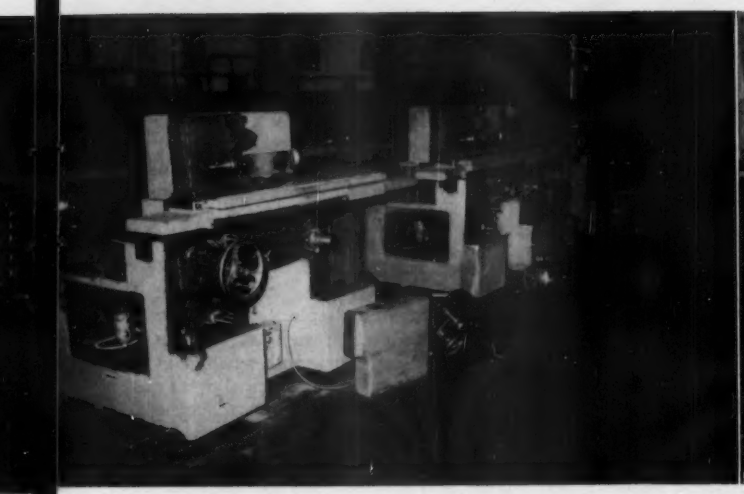
Among recently designed specials at Ilyich are crankshaft grinders, superpolishers, a special grinder for producing helical grooves—and a special grinder that grinds deep slits (¼ to ½ in. and only 0.0079 in. wide) radiated at equal space around a small part.

Most of Ilyich's machines have been installed as recently as 1955, and 97% of them are Soviet-made. But because either of a poor general finish or a casual approach toward cleaning the surfaces, most of the machines look much older.

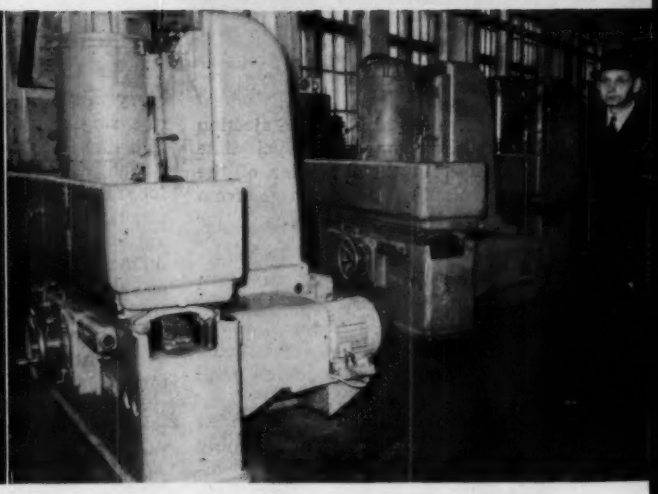
The Ilyich machine shop is fairly conventional, equipped with a number of milling machines and center lathes. Most of the lathes come from the 12,000-lathes-a-year Krasnoi Proletarii plant, and the milling machines from the Gorki factory. Turret lathes used at Ilyich were built by the Ordzonikidze plant in Moscow and by a plant in the Siberian Urals. The Moscow Grinding Machine Plant has made such machines for use at Ilyich as the thread grinder shown in Fig. 1 grinding an oil-pump worm for use on Ilyich's cylindrical grinder assembly operations, and the large slideway grinder shown in Fig. 2 working castings for a cylindrical grinder.

Ilyich's assembly section for cylindrical grinders is in a well-lit bay with plenty of room. Lines are laid out for the various models, and each terminates at the plant's well-appointed paint shop. Ilyich turns out more than 300 cylindrical grinders a year such as those shown in Fig. 3 in the same bay as a number of similar but larger machines. Also going through these lines is a production order for crankpin grinders.

Incidental intelligence: top spindle



3 . . . Cylindrical grinders at Ilyich



4 . . . Moscow surface grinders

Grinding Machine Plants

speed of an Ilyich production model is 30,000 rpm, although higher speeds have been developed for specials. One project Ilyich has in mind is the lightening of spindles as soon as alloys can be found that will maintain stability: another is development of hollow spindles for grinding.

Moscow Grinder Plant

The Moscow Grinding Machine Factory is called the "department store of the grinding industry," earning that title by the wide variety of grinding machines it can virtually produce from stock. Moscow concentrates on types not made by Ilyich, turning out some 70 kinds of grinding machines, including surface grinders, slideway grinders, slotters, machines for grinding pistons, specials for grinding plowshares, superfinishers, gear and spline grinders.

Moscow is set on its own grounds, is a large plant employing 2500. With most machines made on a jobbing basis, production lines naturally are not clearly defined, with the possible exception of the surface grinder assembly shop. It has been a grinder plant for the last 15 to 20 years, is divided into three divisions, turning out surface grinders, specials, and gear grinders. Within these divisions, many different types and sizes of machines are produced. Spline grinders, for example, are built with capacities of 0 to 9.842 ft in three sizes —0 to 3.281 ft, 3.281 ft to 6.562 ft, and 6.562 ft to 9.842 ft. Surface grinders are made either in horizontal types with rectangular tables, or with vertical spindles and rotary tables. On the former, the range extends from tables 11.81 x 29.52 in. to 19.68 x 98.5 in. Vertical spindle machines are available with tables from 15.75 to 59.05 in.

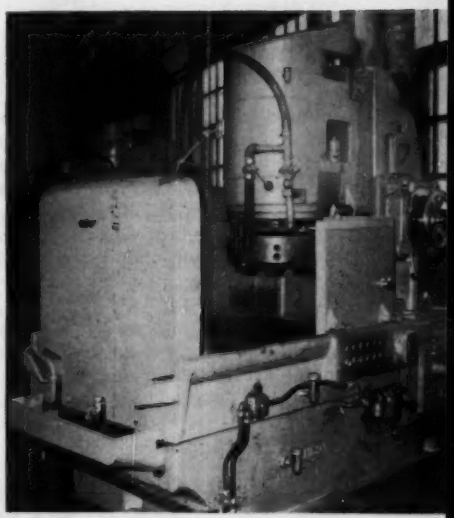
Slideway grinders are made with table lengths up to 26.25 ft, with 52.5-ft-long beds. Range of gear grinding machines extends from 11.8 in. to 47.2 in. dia, up to 16 module.

Employ Western Machines

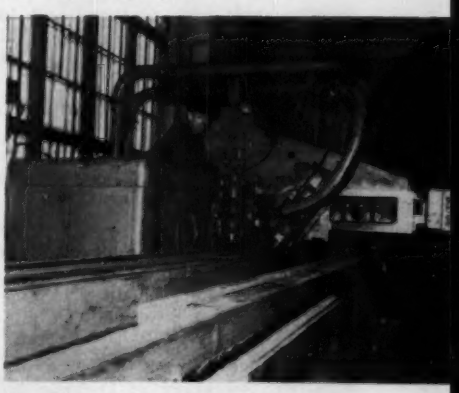
To make these machines, Moscow employs quite a few made-in-the-West machine tools, mainly from Germany, plus a fair proportion of Russian-built ones. In the plant's measuring and standards laboratory, all instruments, including several interesting optical ones, are of Soviet manufacture.

Grinders Made in Same Bay

Both surface grinders (Fig. 4) and spline grinders are manufactured in the same bay, as are the large face grinders shown in Fig. 5. Internal grinders are made in variety of types and feeds, many of them automatic. One centerless internal model is adaptable to either cylindrical or taper grinding, is magazine loaded and fully automatic. Its cycle includes



5 . . . One of the larger face grinders shown being assembled at the Moscow Grinding Machine Factory



6 . . . A slideway grinder at Moscow in process of reproducing itself

RUSSIAN GRINDER PLANTS (continued)

rough grinding, automatic wheel dressing, finish grinding, and ejection of the finished component. Cycle time is adjusted to the diameter of the work, spindle speeds range from 9000 to 15,000 rpm.

Grinds Own Ways

Without exception, all ways are ground on machines made by the Moscow plant, such as the slideway grinder shown in Fig. 6 reproducing itself. It is a 26.25-ft machine, with a 52.5-ft bed in 3 sections.

In the gear grinding section at Moscow, all grinders under assembly were based on the generating principle, with the largest of them having a capacity up to 49.21 in., 16 module. Generally, production of gear grinders is conventional, except that a high-frequency installation does the work normally done by flame hardening.

"Semi-Special" Output

In a plant such as Moscow, it is difficult to assess where the dividing line lies between "one or two at a time" production of standard machines, and specials. A great many machines building at Moscow could probably best be classed as semi-specials.

One item of interest at Moscow was a multi-spindle slideway grinder being built for the Krasnoi Proletarii lathe plant, where it is destined to carry out the grinding of slideways in a single operation on the production line.

Another special, built at Moscow for face-grinding piston rings, has constant grinding wheel speed, and variable table speed. Table has a diameter of 31.5 in., with stepless speed variation. The table is so flat that it is tested within 3/25,000ths of an inch over the whole surface. Also of note at Moscow: a two-spindle automatic surface grinder for automotive production that uses a magnetic table and has automatic magazine feed. The demagnetizer is fitted to the output chute.

Face Grinder Makes Hand Tools

One unusual application of a face grinder at Moscow is for production of wrenches, spanners and similar hand tools. The components nest in appropriately shaped holes in horizontal rotating disks that carry them through the grinding process. Also seen at Moscow: precision machines for piston grinding that are claimed to operate consistently to an accuracy within 5/25,000ths of an inch.

One special developed to grind large plowshares looks clumsy, but it performs an awkward job on a peculiarly shaped workpiece—grinding the surface, and sharpening the back, front and edge of the blade. The machine employs seven spindles, four of them working on the blade in the first four operations, with the rest of the spindles coming into play in sharpening the front, back and edge in the last three operations. Apart from loading and unloading, the whole cycle is automatic. Floor-to-floor time is seven seconds.

Other special types noted: a surface grinder with inclinable table; and a special 3-spindle slideway grinder for leading ways, which also carries a normal grinding wheel that can be employed when the slideway spindles aren't in use. This machine has proved particularly useful in doing maintenance grinding in shops where it needn't be employed full time on slideway grinding.

Also at Moscow is a high-production setup for grinding 8000 piston rings an hour. This is done on a two-sided vertical spindle machine that has a high-precision table. Components are moved through the grinding area by the differential forces produced by setting one spindle slightly off center from the other. This machine works as one of a pair—the second is a vertical spindle superfinishing machine. Machines of the latter type normally use iron wheels at Moscow, and it is claimed they provide a surface finish of less than 1/25,000th of an inch. An abrasive disk can also be used with this machine by incorporating a truing device.

Pentagon Moves To Cut Lead

WASHINGTON — A new military drive is on to cut lead-time on development of new weapons and to push research projects into production as fast as possible. It shows in two recent Defense Dept actions:

- Publication of a top-level study to reduce the time involved in conception, design, testing, and production of new planes. It outlines methods to cut down on development time, reveals that many of these measures are now in effect, and proposes their use in development of guided missiles and other major weapons. One specific proposal is for advance purchase of machine tools.
- Creation of a new Pentagon job, Assistant Secretary of Defense for Research & Engineering, to pull the strings on military research & development and to guide production of new weapons. Frank D Newbury, former Assistant Secretary for Applications Engineering, has been named to it.

His appointment settles a long-time policy dispute over whether the scientific or engineering approach is to dominate military R&D. The official nod goes to the latter.

The proposals to cut lead time center around streamlined management and administration: simpler contracting procedures and design specifications; more authority and longer tours of duty for managers of weapons development programs; faster consideration of new weapon ideas; and the like.

To simplify and expedite procurement and contracting, the study recommends "early release of funds to the contractor so that he can begin tooling up and procuring long leadtime facilities, components and materials." In addition, faster production and delivery of government-furnished equipment—like engines—to airframe producers and other prime contractors is proposed.

Along these lines, the Navy is now making production design and tooling funds available to contractors when experimental contracts are signed. The Air Force has set up a simpler system to pick design contractors—"surveying and evaluating eligible contractors in terms of past performance and current resources."

Two or three selected companies are given preliminary design contract through mockup. The con-

At Long Last: Tax People Will Listen To Industry's Views on Bulletin F

WASHINGTON—The metalworking industry now has its chance to tell the Internal Revenue Service what it thinks of the depreciation guide book used by all its agents—the so-called Bulletin F. A committee of tax experts has been appointed to review the suggestions and criticisms of businessmen, and advise the Treasury and IRS on changes and additions.

Depreciation accounts are tremendously important—to both companies and the government:

- This year depreciation will supply more than $22 billion for new production facilities—60% of all that will be spent.
- Tax collectors keep an eye on depreciation allowances because they are deductible from profits, and therefore escape taxation. The shorter the useful life assigned to a facility for tax purposes, the bigger the annual depreciation allowances will be—a fact that probably causes more bickering between businessmen and revenue agents than any other single provision in the tax laws. Revenue agents often insist on longer useful lives—and therefore smaller annual depreciation reserves—than taxpayers think reasonable.
- The Revenue Service itself acknowledges that its Bulletin F—the only official guide to acceptable useful lives—is outmoded. Bulletin F lists some 8000 depreciable items, giving a useful life for each. It was drawn up in 1942, and has not been changed since.

Here's What You Can Do

You may recommend changes in the old list, or suggest products to be included that are not in the present Bulletin F. Suggestions received up to June 30 will be considered. (For special handling, officials ask that letters regarding Bulletin F be addressed: Commissioner of Internal Revenue, Washington 25, D C, Attention—T:S:EA:F.)

Revision Will Take Time

The Committee thinks the job will take months—possibly running into 1958. Treasury officials say privately they will not approve a wholesale shortening of lines, because of what it would do to tax revenues over the next few years. They add that in some cases, lives in the revised Bulletin F will be lengthened, not shortened.

Despite these warnings, the overall result is almost certain to be in the direction of shorter lives and, in some individual cases, the liberalization may be substantial.

The criterion revenue officials will use in drawing up the new list will be actual business practice. Officials make no effort to guess how long a given piece of equipment might be kept running, or how soon it might be rendered obsolete by an improved product. They will avoid these difficulties, in theory, by going to tax returns and finding out what businessmen have been doing in practice. Letters from businessmen received as part of the revision process will be used for the same purpose.

The continuing unhappiness of taxpayers was summed up recently by Joel Barlow, tax attorney and chairman of the Tax Committee of the U S Chamber of Commerce like this: "The interminable controversies over depreciation would be unnecessary if the tax law did not make it possible for a revenue agent to speculate and second guess the taxpayer on how long a facility will last."

Complete freedom to choose any useful life for tax purposes—long the goal of many tax experts—isn't in the cards. But further curtailment of revenue agents' application of Bulletin F may stem from the revision process.

Time on New Military Weapons

tractor whose design shows the greatest promise is directed to go ahead with the prototype. Says the Pentagon report: "This technique has saved . . . time at a critical point in the development cycle, and avoided considerable waste of engineering manpower, while maintaining a more realistic form of industry competition."

Not mentioned in the report, however, is the criticism that has been levelled at this new policy by some Congressmen and industry men. The charge has been made that the policy concentrates aircraft production among fewer firms.

In the past, the report points out, production of new weapon systems has been held back while the Defense Dept has had to consider pleas for new tools and facilities from contractors.

Now, the Pentagon has set up new procedures to push through processing of such applications. To cut the chain of review, the Air Materiel Command and the Navy's Bureau of Aeronautics can now approve plant and equipment projects up to $500,000 on their own. Larger projects are now being reviewed at higher levels "in advance of the determination of the highly detailed specifications needed for final acquisition and construction."

Finally, the military services now negotiate supply and facility contracts at the same time when possible. That is, production schedules for the end-item and plant and equipment requirements are ironed out simultaneously by the government.

As additional means to cut development time, the committee recommends:

- That "senior, experienced military officers" be named to manage development projects through design, testing, and volume production phases. To insure this continuity of "top-level attention," tours of duty should last at least three to five years.
- Better long-range planning organizations should be set up in the services to define new weapon needs of the operating forces. Steps should be taken to "seek out more quickly and energetically all sources of ideas for new weapons and components, with particular emphasis upon the exploitation of the ideas of industry research and design experts."

Congress To Probe "Industry Concentration"

WASHINGTON—The metalworking industry and its suppliers, among others, are in the line of fire of a number of Democratic-controlled Congressional committees getting ready a raft of investigations into business and business practices.

One of the biggest of the investigations is an inquiry into concentration—that is, the number of companies competing in such industries as primary metals, fabricated metal products, electrical and non-electrical machinery, and transportation equipment.

The Senate Antitrust and Monopoly Subcommittee has been quietly at work on the project for a year or so already. Committee economists preparing for future hearings say they are going to come up with more detail on concentration of capacity in industry than has ever been available before.

The subcommittee is headed by Estes Kefauver (D-Tenn), a strong advocate of small business, and Joseph C O'Mahoney (D-Wyo), a long-time critic of big business and monopoly.

The men working on the study want to show, for the first time, facts and figures on the amount of concentration in important product lines: the concentration in tool steel capacity, for instance, may be a great deal more revealing than readily available information on the total ingot capacity of U S Steel, say, and the other major steel companies.

The last similar industry-by-industry report on concentration was prepared in 1949, and it used only the 450 industry classifications normally used by the Census Bureau in collecting business statistics.

The Symbol System

For the economist, this 450 industry classification—each represented by a four-digit symbol—is a very broad and crude yardstick to measure concentration. For example, the symbol 3312 represents steel works and rolling mills. That includes pig iron, ingots, semi-finished steel, and almost every kind of steel product. Though grouped into one classification, the only common element is that all are made of steel.

These 450 major four-digit industries can be broken down or subdivided into a total of 1000 classifications, each represented by a five-digit symbol. These 1000 subclassifications, in turn, may be subdivided again into 7000 classifications, represented by seven digits.

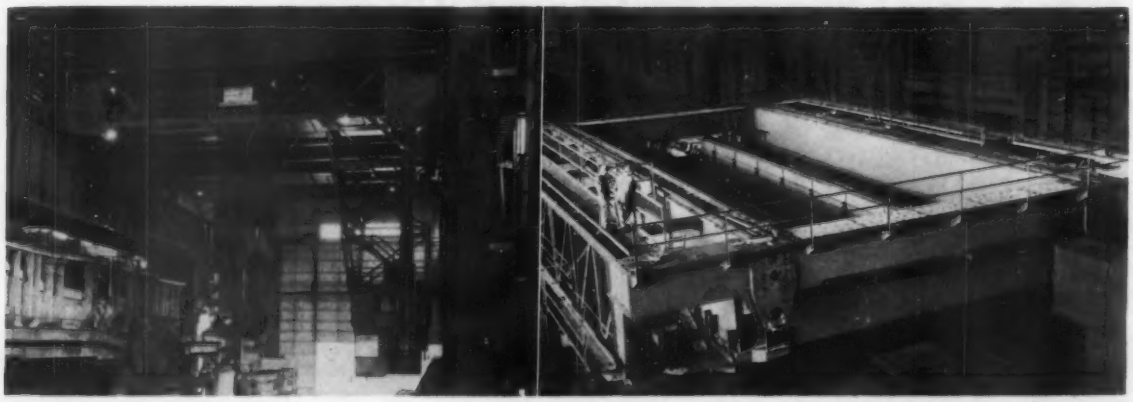
The Senate subcommittee staff expects its new report to include figures on concentration for all the four-digit industries (450), all the five-digit industries (1000), and a selection and grouping at the seven-digit level. The staffers are out talking with industry experts now, getting their technical judgment on what product classifications—especially at the seven-digit level—make sense and how industry itself groups products.

Report to Show Biggest Firms

In addition, the staff report will also show what part of total manufacturing is in the hands of the largest 50, 100, 150, and 200 companies. Another part will compare the largest companies at the time of the 1949 report with their relative positions in 1954 (the latest census year). This is being done for all industries at the four-digit level.

Just what the Subcommittee will do with the figures once the report is finished—or who will run hearings based on them—is impossible to predict. But it's safe to say the report will be a gold-mine for probers.

Who's Got the World's Biggest Ladle Crane?



"We do," say the British and Aussies . . .

Last week, AM received the photo at left from its Melbourne, Australia, correspondent, showing what the British who built it, and the Australians who are using it (Australian Iron Steel Ltd) say is the world's largest ladle crane—a four-girder, 75-ft-span, 410-ton job. Two days later in came the photo at right from Cleveland

"Nope, we do," says U S's Bethlehem Steel . . .

showing the partially assembled bridge of a 500-ton capacity, 68 ft, 4 in. long ladle crane with bridge span of 77 ft and total weight of 1.84-million lbs without the ladle. Built by Morgan Engineering Co, Alliance, Ohio, it's one of three such cranes destined for Bethlehem Steel's Sparrows Point, Md. plant

FIELD REPORT

South...

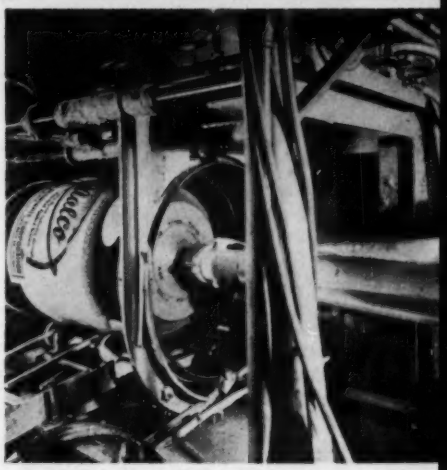
Southern newsnotes . . .

Westinghouse has broken ground for its new multi-million-dollar plant at Athens, Ga. It'll employ 1200, will be producing pole-type distribution transformers by middle of next year . . . **Raytheon Manufacturing Co** will succeed **Sperry Farragut Co** as operator of the Navy guided missile plant at Bristol, Tenn. Farragut currently employs 900 there . . . **Unipress Co,** Minneapolis laundry pressing machinery manufacturer, plans to invest more than a million dollars in new facilities at Atlanta. They'll consist of a 100,000-sq-ft office-plant plus 160,000 sq ft of storage space . . . **Proctor & Schwartz,** Philadelphia textile machinery manufacturer, has an option on a 27-acre site near Waynesville, NC. It plans to put up a 75,000-sq-ft facility to operate as a branch of the home plant . . .**Streed Products Corp** is establishing itself in Gadsden, Ala. It'll manufacture and fabricate alloy pipe, fittings, vessels, and piping accessories; production is scheduled for May . . . **Link-Belt Co** has moved its Louisville, Ky, district office to larger quarters at 235 East Burnett St . . . **Lockheed Aircraft's** Georgia Division at Marietta is slated for $2 million worth of rehabilitation and non-recurring maintenance work. Main factory will get most of the improvement . . . **Ingalls Shipbuilding Corp** will erect another platen at its Pascagoula (Miss) works for construction of shell submarine hulls . . . **Southern Precision Pattern Works** will soon have the largest complete pattern shop in the country. It's building a new $150,000 plant in Birmingham, Ala, will employ 100 workers by year's end . . . **Continental Gin Co,** Birmingham maker of materials handling equipment, will spend $2 million on expansions during the next three years, half of it for improvements at the Birmingham plant . . . **Miami** (Fla) **Window Corp** has taken over the **Ohio Die Casting Corp** of Columbus, Ohio, will operate it as a subsidiary . . . **Precision Tool Co,** Memphis, has organized a new subsidiary, the **Mid-South Metal Co,** which is now producing the illuminating charge for the 155-mm Star shell . . . **Universal Rack Co** has just opened its doors in Lebanon, Tenn. It turns out wire racks used for plating metals.

West...

Briefs from the West . . .

San Francisco Naval Shipyard has started work on construction of a major combatant vessel. Ship, a 512-ft guided missile frigate, will take three years to build. Keel will be laid this summer . . . **Harvey Machine Co,** Torrance, Calif, has a $1.6 million Navy contract to make armor piercing incendiary projectiles for 20-mm aircraft guns . . . **Avildsen Tools & Machines, Inc,** has moved from Los Angeles to a new, million-dollar plant in Glendora . . . **Hughes Aircraft** has cut production to four days a week at its Tucson, Ariz, missile plant; says it's result of re-alignment of production, parts delivery, and company delivery schedules . . . **Kaiser Engineers Division** of **Henry J Kaiser Co,** Oakland, has acquired world-wide rights to manufacture the P T oxygen gun developed by **The Steel Co of Wales, Ltd,** for applying high purity oxygen in open hearth furnaces to speed refinement of steel. Kaiser has right to license other firms . . . **General Motors** paid its 12,000 California employees $64 million last year . . . **Solar Aircraft** has $12.2 million in orders for J57 turbojet engine components; it'll turn them out at both the San Diego and Des Moines plants . . . **Buck Mfg Co,** maker of Bux magnetic tools, has moved into a new manufacturing plant and offices at San Jose, Calif; production capacity is tripled . . . **Hughes Aircraft** has extended its engineering scholarship program to include undergraduates outside the company. Those who qualify will work 20 hours a week as student engineers at the company's plant in El Segundo. In addition to being paid for their work, they'll receive education grants from Hughes covering college tuition, lab fees, and related expenses . . . **Temco Aircraft** has received a new, multi-million dollar contract from **Lockheed Aircraft** for manufacture of wings for the AF ultrasonic F-104 fighter . . . **Lockheed** reports purchasing expenses in '56 for materials, parts, and services added up to $620 million and included orders to 11,000 firms in 45 states . . . San Diego Union newspaper spot check discovered 7000 engineers active in civil, aircraft, electronics, and other fields in the city whose population is just under half a million.



New Centrifugal Spray Technique

CHICAGO: A new high in steel shipping container lining quality is reportedly achieved with a method of centrifugal spraying developed here by Rheem Mfg Co. The process, coupled with a new hi-temp curing process, produces linings that can carry foods, chemicals and other materials hitherto considered impossible or impractical to ship in steel containers

Midwest...

Around the Midwest . . .

Dumore Co, Racine, Wis, has set up a **Nilos Ring Division** to distribute these sealing devices made by **Ziller & Co,** Dusseldorf, Germany . . . **Standard Steel Treating Co,** major Detroit area specialty heat-treat concern, has bought **Steel Treat, Inc,** a complete production heat-treating plant to be operated and known as **Standard Steel Treating Co, Plant 2** . . . **American Gage & Machine Co,** Chicago, has acquired the **Standard Transformer Co,** Warren, Ohio, maker of electric transformers for utilities . . . **Fruehauf Trailer Co,** Detroit, has converted its Delphos, Ohio, plant for production of equipment for guided missiles. This is the third of the company's facilities to be fully occupied with government prime and subcontract work . . . Plans are in the works for merger of **Whirlpool-Seeger Corp,** St Joseph, Mich, and **Birtman Electric Co,** Chicago appliance maker. If stockholders approve, union will go into effect April 1 . . . **Mobile Drilling, Inc,** Indianapolis, has bought the Earth Drill business of **Allis Chalmers'** Buda Div . . . **Au-**

FIELD REPORT

tomatic Sprinkler Corp, Youngstown, Ohio, has opened new plants in Cincinnati and in Berwyn, Penna. Regional facilities in the US now total 23 . . . **Thompson Products** plans to set up a research, development, and engineering center near its Euclid, Ohio, plant. The $5-million project is scheduled for completion within five years . . . **Carpenter Steel Co,** Reading, Penna, has opened a new mill-branch warehouse in Toledo to stock and service tool steels and drill rods . . . **Omer E Robbins Co,** maker of the Magna-Sine and other angular toolroom equipment, has put up a new 10,000-sq-ft building at its Detroit facility . . . **Service Recorder Co,** Cleveland manufacturer of devices that record busy and idle time of machinery, has moved to larger quarters at 1013 Rockwell Ave . . . Other relocations: **Reliance Electric & Engineering Co,** 24701 Euclid Ave, Cleveland, and the **Kett Tool Co,** 5055 Madison Rd, Cincinnati.

East...

Eastern shorts . . .

Republic Aviation is laying off 4000 production workers during the next three months. Company says cut is due to "phasing out" of manufacture of F-84 Thunderstreak fighters before heavy volume production gets underway on its new F-105 Thunderchief late next year . . . **Firth Sterling,** Pittsburgh, is going into the jet engine business in a bigger way. Through an arrangement with **Kolcast Industries,** a **Thompson Products'** subsidiary, it'll process super alloy ingots into bars and billets adaptable for use in manufacturing turbine buckets and other high-temp parts. **Kolcast** is expanding, expects to reach capacity of 600,000 lb of ingots a month . . . **W H Nichols Co,** Waltham, Mass, manufacturer of the Nichols Precision Milling Machine, has appointed the **Robert E Morris Co,** West Hartford, Conn, as national distributors. **Morris** will continue the policy of distribution by local machine tool dealers. West Coast sales representatives are **Harron, Rickard & McCone** of Southern California; **B H S Machine Co,** San Francisco; **Hallidie Machine Co,** Seattle; and **Harry M Euler Co,** Portland, Ore . . . **Pratt & Whitney Aircraft's** nuclear engine program has been set up as a separate operation of **United Aircraft's** engine building division. Work will be carried on at the new AF-sponsored facility in Middletown, Conn . . . **Veeder-Root Inc,** Hartford, has set up a laboratory in Danvers, Mass, for design and development of electronic controls, counters, and instruments . . . **General Fittings Co,** East Greenwich, RI, has added a number of industrial electric heaters to its product line through purchase of the **Hayden Heater Co** of Easton, Md. Hayden's manufacturing facilities have been moved to East Greenwich where it'll continue to operate as a division . . . **General Electric Co** denies that it has scrapped plans for a multi-million dollar guided missile engineering and research center at Valley Forge, Penna. **GE** says it had to give priority to $500 million worth of other expansion, and that construction of the lab is at least two years off . . . **Airborne Instruments Laboratory, Inc,** Mineola, NY, will merge with **Aircraft Radio Corp,** Boonton, NJ, manufacturer of communications systems . . . **Electro-Air Cleaner Co,** three-year-old Pittsburgh firm, has incorporated, will move into new 23,000-sq-ft plant in June . . . **Breyllium Corp** is reducing prices by 2¢ a lb on all copper-based alloy ingots and wrought products.

Smithsonian Exhibit . . .

is this vintage 1916 surface grinder, foundation of today's Abrasive Machine Tool Co, Providence, R I. It's the first machine of its kind to use one-piece cast frame with the motor mounted in the interior. The machine is now in the Smithsonian Institute in Washington, D C, where it is on permanent display in the Division of Engineering

WALLACE E CARROLL

Wallace E Carroll, president and treasurer of American Gage & Machine Co, Chicago, has been appointed director of the Metalworking Equipment Division of the Business & Defense Services Administration, US Department of Commerce. He succeeds **J Robert Jones,** vice president, sales, of Kearney & Trecker Corp, who is returning to his company. Mr Carroll established the Size Control Co in 1941 which, together with the Walsh Press & Die Co, is a subsidiary of American Gage. He is also treasurer of Affiliated Screw Products, Simpson Electric Co, and G M Diehl Machine Works. He served as president of the Chicago Tool & Die Institute in 1954 and 1955.

W Thomas Gettig, general manager of Rockwell Manufacturing Co's Barberton, Ohio, valve plant, has been named assistant to the vice president in charge of the Meter and Valve Division. **Elton H Sellers,** works manager of the Barberton plant, succeeds Mr Gettig.

Curtis D Cummings, sales manager of American Chain & Cable Co's Allison Division, has been named to head sales of the Campbell Machine Division

George A Viscomi, assistant sales manager of Lees-Bradner Co's Manufacturing Division, has been appointed sales manager

William R Jennings, factory manager of the Axelson Manufacturing Co, Division of US Industries, has been promoted to manager of the Machine Tool Division

Dan R Scott has been named sales manager for the Allied Products Division of Motch & Merryweather Machinery Co. He was formerly assistant sales manager for the Division

Names in the News . . .

James R Fagan has been elected president and treasurer of Foote Bros Gear & Machine Corp, Chicago.

Norman K Anderson, vice president, sales, of Warner Electric Brake & Clutch Co, Beloit, Wis, has been named vice president and general manager of the Warner Industrial Division. **King DeSeve,** vice president in charge of the company's manufacturing operations, has been appointed vice president and general manager of the Warner Automotive Division.

William J Swallow has been appointed manager of the Chicago assembly plant of Ford Motor Co's Ford Division. Formerly manager of the Buffalo assembly plant, he succeeds **S L Simmons,** promoted to manager of the Mahwah, NJ, assembly plant.

Ernest S Griswold has been promoted from assistant chief engineer to chief product engineer of Pratt & Whitney Co's Cutting Tool Division

Hal O Gummere, vice president and general manager of Buckeye Tools Corp, Dayton, Ohio, has been elected executive vice president. **Ernest B Meynard,** general sales manager, has been appointed vice president, sales.

Norman F Trost has been appointed president of Narmco Manufacturing Co, La Mesa, Calif, fabricator of aircraft and missile components. He was formerly associated in executive capacities with General Motors' Aeroproducts Division at Dayton, Ohio.

Robert J Decker, treasurer of Emhart Manufacturing Co, Hartford, Conn, has been elected vice president and treasurer.

H T Ross, manager of engineering for Linde Air Products Co, has been named vice president, engineering.

Kurt J Ucko, sales manager of the Machine Tool Division of Kurt Orban Co, Jersey City, NJ, has been elected a vice president of the company

Paul W Norris has been appointed vice president and general manager of the Denison Engineering Division of American Brake Shoe Co, Columbus, Ohio, and **Denison Neale** has been promoted from assistant director of sales to director. Mr Norris, formerly vice president and director of sales, and assistant general manager for the past year, has given up his sales duties, and will devote more time to over-all management.

Lawrence W Kelbley has been named director of manufacturing for Datamatic Corp, Newton Highlands, Mass. He was formerly plant manager at the Calidyne Co, Winchester, Mass, manufacturer of electro-mechanical devices. **John E Johnson,** Datamatic sales director, has been appointed vice president, sales.

Paul W Hook, treasurer and assistant to the president of Wellman Bronze & Aluminum Co, Cleveland, has been named executive vice president and treasurer. Other appointments: **Glenn F Ihrig,** general sales manager, to vice president, sales; **Gene Faubel,** sales engineer, to assistant sales manager.

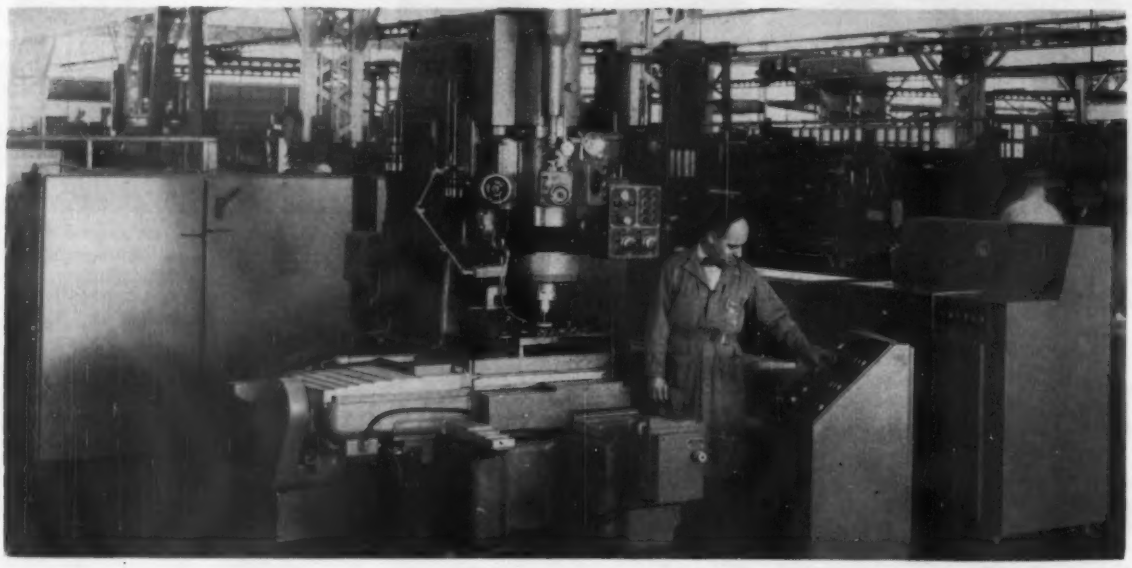
Lyle R Blossom has been appointed general manager of the new Detroit Manufacturing and Engineering Division of Burroughs Corp.

OBITUARIES

Harry W Barkley, 52, president and general manager of National Tool Co, Cleveland, died Feb 3.

Joseph F Joy, 73, founder of the Joy Manufacturing Co, Pittsburgh, died in Florida Feb 19.

New Shop Equipment



Numerical Control System Positions Machine Tools

Pratt & Whitney's new system of numerical control makes possible automatic accurate positioning within .0001 in. when applied to company's line of jig borers, vertical hole grinders and rotary tables. The Electrolimit measuring systems of these machines have always been capable of this accuracy but the machines were limited to toolroom operation. Automatic programming converts them to production units.

The first of these units has been delivered to the Aircraft Engine Div. of Ford Motor Co in Chicago. The numerical control system is based on the decimal system (decimal of an in. and decimal of a degree of arc), and all the data needed for locating, indexing, boring and grinding are punched on tape and translated directly into mechanical action by the machine. Punched records were considered preferable to magnetic or optical storage of digital data because of the simpler equipment necessary to sense a punched hole.

A pneumatic sensing system is the heart of the tape reader. Air is forced through holes in the tape to a chamber with a neoprene diaphragm which provides enough force to operate a limit switch. Tape is moved into position and stopped automatically. When it stops, all the data necessary for a single operation is read at once and fed automatically to the machine. Upon completion of this operation the tape is advanced one block so that new information can be presented. In addition to the tape control holes, a single block may contain up to 38 decimal digits of information.

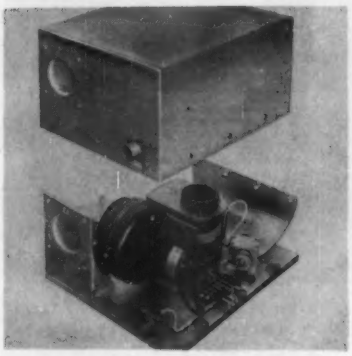
The measuring system is made up of several digital-to-analog converters with proper bench marks for refining the accuracy as successive settings are made. By breaking the measuring problem up into several converters, lower accuracy converters may be used. This method is well suited to the company's Electrolimit measuring system which uses a measuring bar which has accurately located lugs at 1-in. intervals combined with a micrometer screw for adding distances of less than 1 in.

Numerical control offers many advantages: Elimination of human error in reading and setting dials, ability to rapidly set all slides and verniers simultaneously, reduction of scrap losses, increased operating speeds, minimum setup time, constant precision, and fewer jigs and fixtures. With this system automatic programming and operation become practical for short production runs and for the machining of one or two pieces with multiple holes at a minimum of operator fatigue. Operator training periods reportedly can be substantially reduced because the high skill needed for precision work is built into the system.

Pratt & Whitney Co, Inc, West Hartford 1, Conn

DIGITAL INFORMATION punched into tape automatically operates P & W vertical hole grinder. Operator's control panel at left

Materials and Parts . . .



Electrosonic Cleaning Unit Handles Large Objects

Latest model in line of transducers for use with company's Electrosonic Generator is a tank-mounted magnetostrictive type with high capacity. It is designed for use in conveyor operations and permits ultrasonic cleaning of larger objects or a greater number of small objects. Effective over the entire cleaning area, the unit is recommended for dual mounting on production line tanks, or on separate tanks for portability.

Cleaning solvent is put into tank, switch is thrown on the generator, and sound waves instantly begin loosening the foreign matter from the parts. Intricate parts present no problem and no training is required to operate the device. Unit is built by Telephonics Corp.

Dist by John B Moore Corp, Nutley, NJ

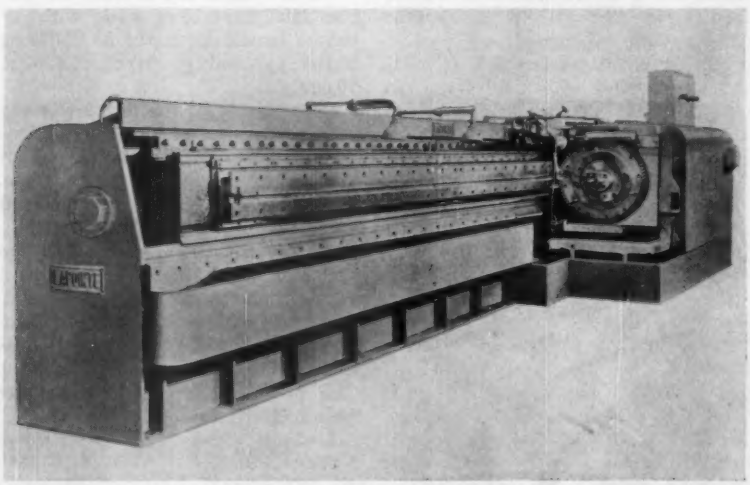
Spot Welding Accessory Is Semi-Automatic

Spot and tack welding accessory can be used with all models of GE's semi-automatic Fillerarc wire drive unit.

Available in kit form or as a factory-installed accessory on current models, set consists of a gun adaptor kit and control. Gun kit includes a screw-on nozzle and two sets of locating plates for butt, corner, and fillet welds, and can be adapted for other configurations.

Controls are mounted permanently on a steel door that replaces the standard door on the wire drive unit. They include a timer, which can be set for welding times of from 8 to 360 cycles; on-off switch; slow-fast switch for speed with which wire drive is started.

General Electric Co, Schenectady 5, NY



GAS TURBINE WHEELS for General Electric's 16,500-kw gas turbine engine are broached on this 50-ft, 240-in. stroke, horizontal broaching machine. It broaches a slot 1.6 in. deep and up to 5-in. rim thickness, removing 150 lb of metal per wheel. Index is held to .0002 in. of true position, and the broached form is held to a tolerance of .0003 in. Adjustable-voltage 100-hp broach drive equipment drives 16,000-lb slide—*Lapointe Machine Tool Co, Hudson, Mass*

...including

MACHINE TOOLS AND ATTACHMENTS

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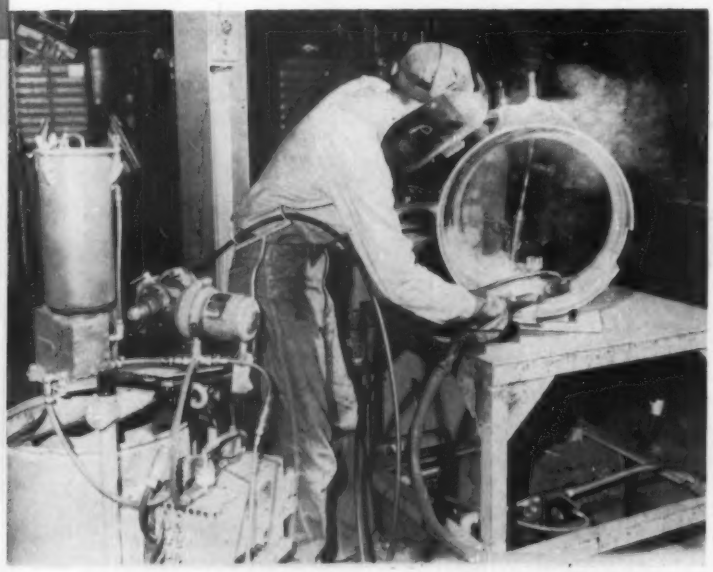
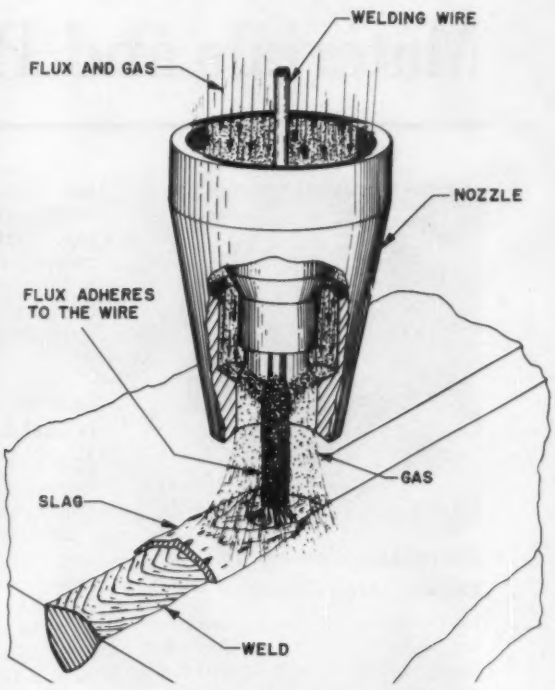


WELDING OPERATION requires no pre-weld preparation, even on materials having normal mill scale or rust. Metal transfer is spray-type, and very little spatter is evolved



WELDING TORCH ASSEMBLY allows manual operation of process that has versatility of covered electrode welding and high deposition rates of submerged arc welding

Linde Process Welds Carbon Steel Without Surface Preparation

Unionarc welding is a semi-automatic metal arc-welding process, using a continuously-fed bare wire electrode, powdered magnetic flux, and carbon dioxide gas. The flux is carried to the nozzle by the CO_2 stream and surrounds the welding wire as it is fed from the tip of the torch. When welding current is flowing, a magnetic field is established around the extended portion of the welding wire. Flux is attracted toward the wire and coats it. As wire is directed into weld puddle, flux melts, refining the weld metal and shielding it from atmospheric contamination. The CO_2 flowing from the nozzle also helps to shield the metal and the arc. This open-arc characteristic permits excellent visibility of the weld zone.

The electrode, bare wire of common steel composition, is continuously-fed from a 300-lb-capacity pack through a flexible tube to the torch. The pack is supported and rotated on a motor-driven turntable, controlled so that wire tension at feed rolls is minimized.

Specially compounded magnetizable flux flows from a dispenser to the torch. The dispenser can be adjusted to feed different flux-to-wire ratios, the usual rate being between ⅜ and ½ lb of flux per lb of wire. Flux is fluidized at dispenser in a stream of CO_2 gas and is transported to the torch.

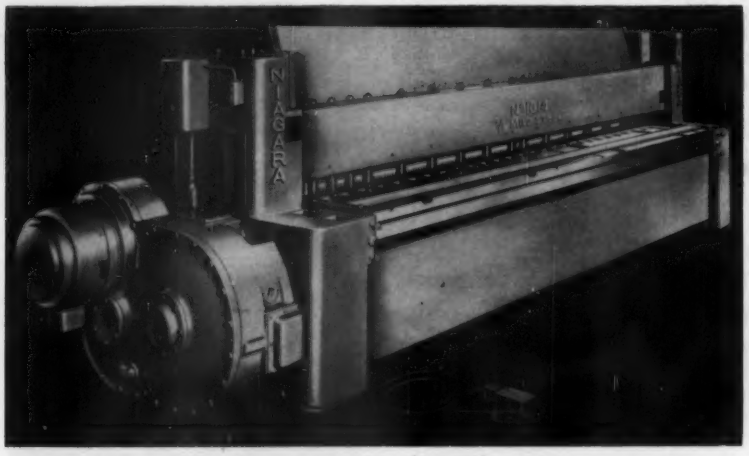
Welds can be made manually in all positions with reportedly greater speed and less cost than with conventional covered electrodes. High-quality welds are produced even where moderate amounts of rust, scale, and moisture are present, as well as when there are minor gaps. Welds in carbon steel have been made with ultimate tensile strengths of 75,000 to 85,000 psi and yields of 65,000 to 70,000 psi.

Constituents of the flux lower the surface tension of the puddle, improving weld surface contour and, at same time, lower the cooling rate. The thin skin of fused flux comes off easily.

At present, 3/32 and 3/64-in.-dia welding wires are used, and direct current reverse polarity is generally preferred. Welding machine, complete with torch, gas regulator, hose, and control cables costs approx $2400. The process is licensed, the charge being .025¢ per lb of rod used.

Linde Air Products Co, Div of Union Carbide and Carbon Corp, 30 E 42nd St, New York 17, NY

MANUAL WELDING TORCH, UAW-1, and cable assembly. Welding current cable is heavy black one; center is flux-gas cable; top is control cable



Niagara Power Squaring Shears Feature Hinged Back Gage Angle

Niagara line of underdrive squaring shears has been modernized to include many new features. The shears now have hinged back gage angles that enable long plates to be fed through the shear; adjustable, parallel micrometer back gages; light beam shearing gages; remote control electric foot switches; and stationary safety guards.

Line includes 59 models with capacities ranging from 16 gage to 1-in. mild steel, and cutting lengths from 4 to 20 ft. Bulletin 69G.

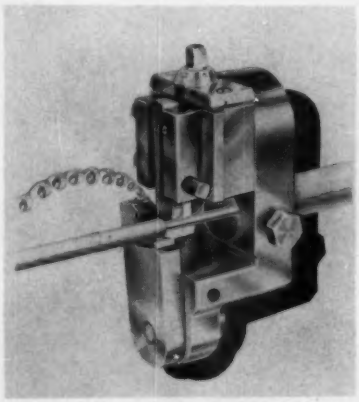
Niagara Machine & Tool Works, 683 Northland Ave, Buffalo 11, N Y

Clamping Toolholder Offered For Oxide Indexable Inserts

New Superigid toolholders are available in 1 x 1-in., 1 x 1¼, and 1 x 1½-in. shank sizes, RH and LH, for special ¾-in. square and ⅝-in. included-circle triangular Diamonite oxide indexable lozenge insert turning tools, shoulder tools, and facing tools, with negative, neutral, and positive rake.

Body and clamp are precision machined high-carbon, heat-treated steel.

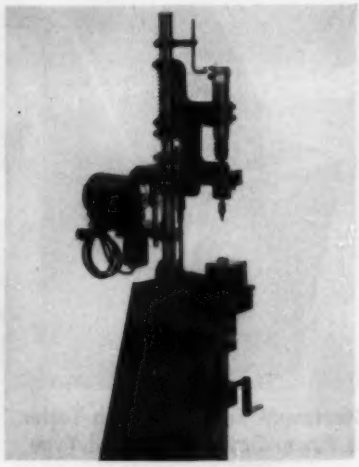
Diamonite Products Mfg Co, Canton 2, Ohio



BOX TOOL features micro-fine adjustment for cutter and carbide-tipped back rests with built-in coolant tubes. Tool holder can be used for both left and right-hand turning—*R B Tool Co, Inc, 785 N Broadway, White Plains, NY*

Compact power unit, for company's previously announced Varidyne System (*AM*—Jul 30 '56, p139), is designed with drive motor and alternator on the same side for applications where limited space is a factor. System is designed for coordinating machinery, conveyors and other multiple-drive operations. Bulletin 1910.

U S Electrical Motors Inc, Box 2058 Terminal Annex, Los Angeles 54, Calif



Floor Model Riveters Feature Rapid Gap Adjustment

Two Airflex floor model riveters have been redesigned to include an adjustable anvil, fabricated steel base and a built-in sound deadening chamber for exhaust air. Both the manual foot-pedal model and the electrically-operated-and-timed model, each in a series of five capacity sizes, will have the new features. New series is designated ANB and covers a range of rivet capacity from 1/32 to ½ in., based on solid mild steel.

Machines will retain original spin-impact design, combining spindle rotation at 500 rpm and impact rates to 16,000 bpm, and will set solid and hollow rivets. Models include ¼-hp, 110-v motor, belt, anvil, rivet rest and peen, and spanner wrench. Prices start at $951. Belt guard is optional; specially tooled index units are available.

Lemert Engineering Co, Inc, 201 E Jefferson St, Plymouth, Ind

Drills made of 18% tungsten high speed Sheffield steel are double heat-treated to secure hardness without brittleness and to withstand high torque and strain. Each drill is given maximum land relief and is ground and polished to micro-finish.

Air Transport Equipment, Inc, N Albany Ave, Amityville, LI, NY

Dial bore gage kit, designated Tri-O-Set, contains 3 dial bore gages covering range from ⅛ to ¼ in., ¼ to ½ in., and ½ to 1 in.; indicator is graduated in 0.0001 of in. Kit also contains Setmaster that masters the three gages to any dimension within a range of 0 to 1 in.

Boice Gages, Inc, Hyde Park, NY

Sturtevant Torque Wrench Tester Is Power-Operated Optical Type

Full range industrial production torque wrench tester features torsional-shaft measuring device that is submerged in pre-heated oil which assures constant operating temperature. There is no mechanical connection between measuring element and indicating pointer, as pointer is projected onto scale through optical system. Pointer is shadow image, thereby eliminating parallax errors.

Power loading device enables wrenches to be tested to full capacity in seconds. Tester will handle all types of torque wrenches including reflex or sensory signalling models.

Model OTT 250-I ranges from 0 to 250 in.-lb; Model OTT 165 from 0 to 165 ft-lb; and Model OTT 500 from 0 to 500 ft-lb. Electrical connection is 120v 60c.

P A Sturtevant Co, Addison, Ill

Tank-Mounted Rotary Compressor Features New Rotor Blade Design

A 5-hp tank-mounted rotary compressor, known as the Davey Hydrovane, has a displacement of 21 cfm, and features a "multi-thrust" rotor blade and contour-bored stator. This rotor-stator arrangement, in combination with two multi-stage cooling oil injection chambers, is reported to compress air efficiently, quietly, and at a lower temperature than is possible with conventional designs. Moving parts are minimized.

Overall dimensions: width, 25 in.; length, 48 in.; height, 44¾ in., with horizontal tank. Vertical tank model is also available.

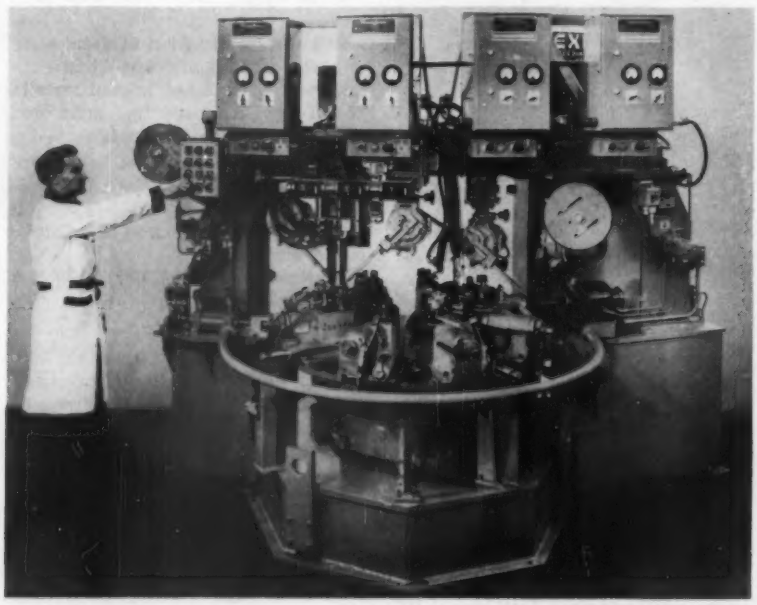
Davey Compressor Co, 600 Franklin Ave, Kent, Ohio

Barrett Hydraulic Elevator Is Portable, Pedal-Actuated

Hydraulic elevator, designed for loads up to 750 lb, has a lifting height of 71 in. Unit weighs approximately 270 lb, has a 24 x 24-in. platform, and an overall height of 83 in.

Hydraulic system allows loads to be lifted by pressure on the foot pedal. Unit features an over-sized oil reservoir, oil wipers, O-ring-sealed motor, and anti-friction-bearing wheels. Construction is of all-welded steel.

Barrett-Cravens Co, 628 Dundee Rd, Northbrook, Ill



AUTOMOTIVE ANCHOR PLATE ASSEMBLIES are welded on automated 8-station rotary index CO_2 arc-welding machine which positions and welds a plate and bushing together to produce 320 units per hr at 80% efficiency. Index table is driven by cam index mechanism and has eight two-stage fixtures. Parts are positioned at start of cycle; bushing is positioned by air cylinder; parts are tack welded and then receive continuous contour weld at last station—*Expert Welding Machine Co, Div of Expert Die & Tool Co, Inc, 17144 Mt Elliott Ave, Detroit 12, Mich*

Conveyor drive, known as Concentro-Drive, has gear reduction unit inside the pulley. It can replace such common drives as torque-arm reducers, geared-head motors and standard reducers, all of which need chain or belt drive. Variable speeds attained through variable pitch pulley on driving motor. Unit is lubricated for life.

Bunke-Musser Inc, Dept 101, Jackson Center, Ohio

Grinding wheels, of fiberglass-reinforced resinoid type, are available in two new models: one is a foundry cutoff wheel available in diameters up to 20 in.; other is depressed center type wheel that comes in 7- and 9-in. diameters. Cutoff wheel can be used on steel alloys and non-ferrous castings for tuck pointing, cable cutting and general purpose cutoff work. Depressed center wheel is designed for grinding hard-to-get-at spots with portable units.

Electro Refractories & Abrasives Corp, 344 Delaware Ave, Buffalo 2, NY

Let's Talk about Tools and Money

Never in history has competition for the consumer's dollar been keener than it is right now.

In the face of mounting costs, the manufacturer is under continual pressure to turn out a better product at a lower selling price. Inevitably, this problem of producing more for less is laid squarely in the lap of production.

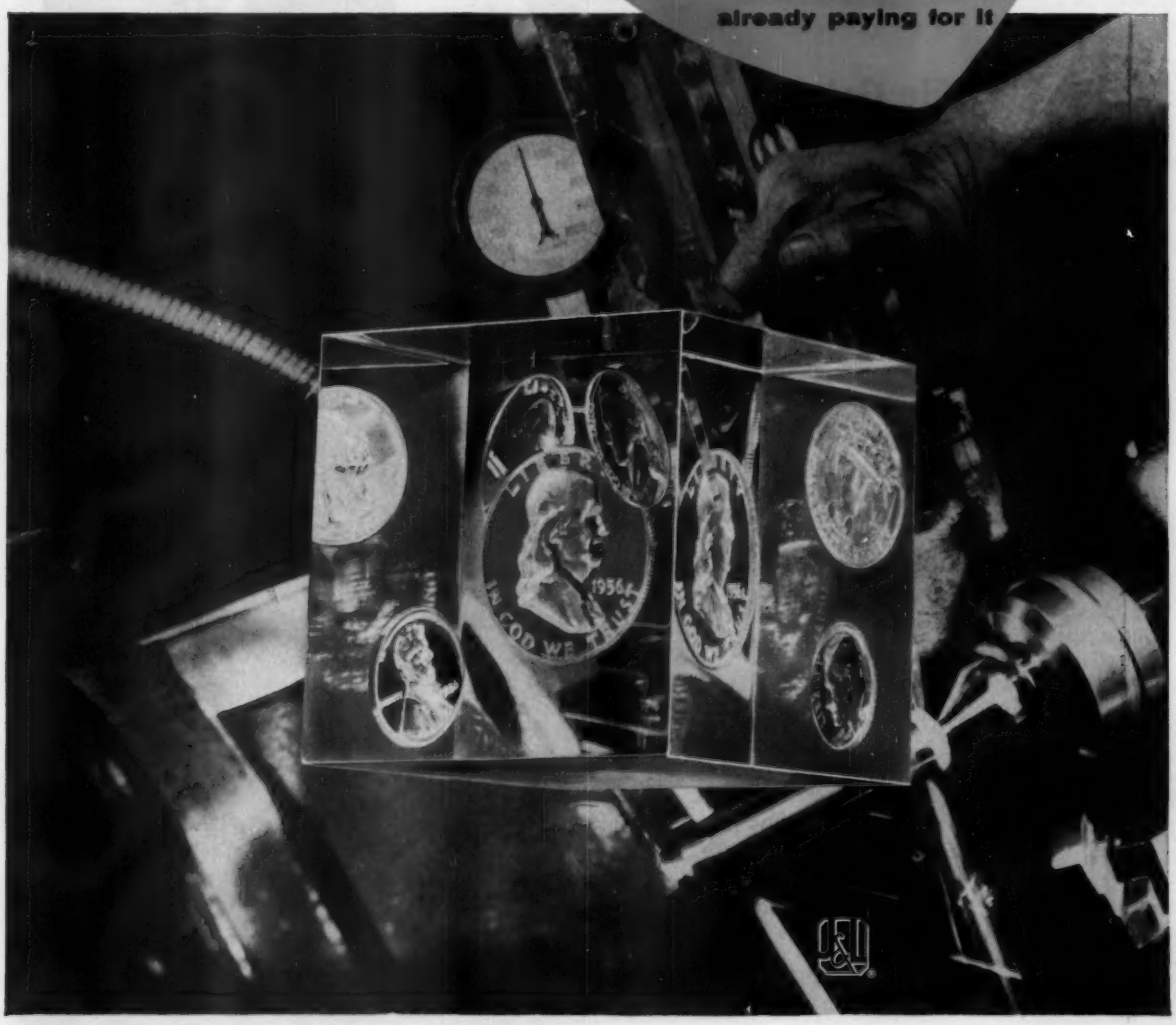
Quite obviously, when machine tool miracles are a "must", to tolerate outmoded equipment is to embrace disaster. Only the *most advanced, most efficient* machine tools can play a part in producing the marvels that *must* be wrought.

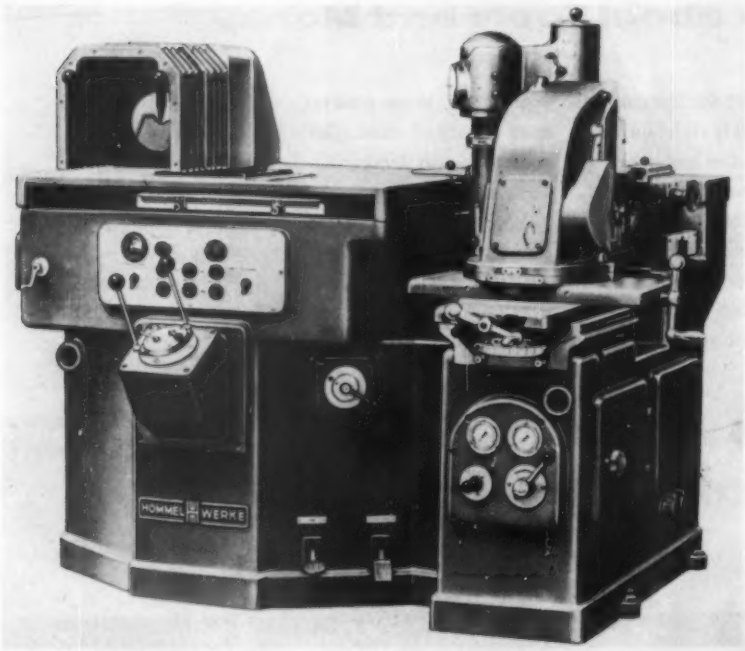
We invite you, as a member of production management, to study the following pages on which are shown representative J & L products. JONES & LAMSON MACHINE COMPANY, 502 Clinton Street, Springfield, Vermont.

JONES & LAMSON MACHINE COMPANY

the man who needs a new machine tool is already paying for it

We offer a variety of finance plans.





Optical Profile Grinder Is Offered in German Version

The Hommel OPSM optical profile grinder is hydraulically controlled, and is adaptable to many operations: grinding profile gages, circular form tools, straight form tools, press tool punches, cams, and the checking of profile on any of the above-mentioned ground parts.

Desired profile is drawn on transparent plastic sheet in the selected enlarged range (between 10:1 and 50:1). Sheet is placed on projection table and work is ground to it. On the projection screen, a portion of the profile drawing, corresponding section of workpiece and the cutting wheel are viewed simultaneously.

Special equipment includes a rotary indexing fixture, cylindrical grinding attachment, wheel dresser and reflex illumination.

Imported by Aaron Machinery Co, Inc, 45 Crosby St, New York 12, NY

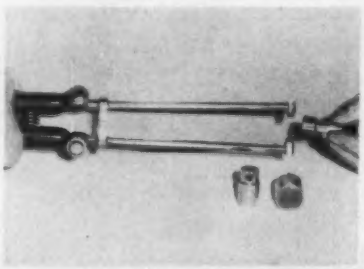
Webb Longitudinal Seam Welder Takes 3 to 30-in.-dia Work

Series B longitudinal seam welder is designed to weld longitudinal seams on various cylinders and flat sheets, and can be used manually or automatically.

Clamping of the seam is done manually and can be operated independently. Hand-operated eccentric cams provide downward pressure against arched-spring clamping arms, which force hold-down clamps against work. Lower horn serves as back-up bar and can be replaced by any of several available bars.

All models will handle work from 3 to 30 in. in dia. Available in floor and bench-type models, unit comes in three sizes and three standard lengths, 18, 24 and 30 in.

Webb Corp, Webb City, Mo



Bethlehem Gas-Oxy Hand Torch Has Interchangeable Burner Heads

Gas-oxygen hand torch called Insto-Change features three interchangeable tips; tip can be changed by squeezing the handles, and can be tilted freely at any angle.

Thorough gas mixture is obtained by the intimate grouping of gas and oxygen outlets in a compact area. In the large burner, 96 orifices are clustered in an area of 1-in. OD. Small burner has 12 orifices in burner-head diameter of ⅜ in.; in the medium-sized burner 48 orifices are grouped within a ¾-in. diameter. Turbulence is said to be eliminated by the use of very small circular orifices in the head for both gas and oxygen. Gas and oxygen unite entirely outside the burner head, because both are fed through separate orifices.

Torch burns gas at ordinary city pressure, and will burn manufactured or natural gas as well as hydrogen, propane, and other gases. Tool is 13½ in. long, weighs 10 oz.

Bethlehem Apparatus Co, Inc, Hellertown, Penna

DRILLING MACHINE, Kor-It, saws holes 1 to 6 in. in dia at rate of 1 in. per min through reinforced concrete. Unit, comparatively noiseless, weighs 150 lb, uses a GE 3450-rpm motor—*General Electric Co, Schenectady 5, NY*

Positioning control, Model AS, employs bridge circuit and reportedly gives positioning accuracy of 0.5% and repeatability of 0.25%. Other applications include remote positioning of valves and dampers, control element in automatic selection equipment, and remote instrumentation.

Wallson Associates, Ltd, 89 Shepherd Ave, Newark, NJ

Brightening agent line has been expanded with the addition of ARP #52, a zinc barrel brightener available in powdered form, and ARP #41, a liquid brightener for cadmium. Both are reported to produce lustrous deposits at lower costs.

Allied Research Products, Inc, 4004-06 E Monument St, Baltimore 5, Md

Sets a New High in Automatic, High-Volume Production

A typical example of one Jones & Lamson approach to "automation" is this line. Here is completely automatic handling with both machine transfers and inter-machine transfers. In this line are 4 Fay automatic lathes and 1 milling and center-drilling machine. J & L machines of this type have been in use for many years in production plants throughout the world.

The simple, rugged transfers used in this line were designed, engineered and built by J & L. Control combinations are, of course, tailor-made for each individual application.

Automatic handling is also adapted to grinding operations, as shown by this J & L Model "E" Grinder (inset photo) which handles 136 steering worms per hour.

Send for Catalog No. 56. JONES & LAMSON MACHINE COMPANY, 502 Clinton Street, Springfield, Vermont.

JONES & LAMSON "AUTOMATION"

Turret Lathes • Fay Automatic Lathes • Milling & Centering Machines • Optical Comparators • Thread Tools Thread & Form Grinders

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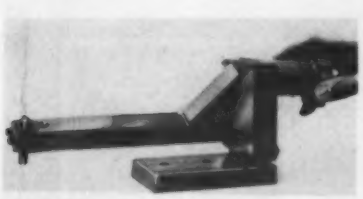
Stevens Plating Unit Designed For Small-Shop Operation

Production plating unit, Little Steve, is the latest addition to the company's line of plating and processing machines. It is small in size, measuring 7 ft wide, 32 in. high, and 10 ft or more long, but has a high capacity. Zinc plating of small parts (illustrated) is carried on at a rate exceeding 100,000 parts per day. The carrier arms can be used as racks for individual parts or as holders for smaller racks.

The unit, designed for plating such parts as hardware, plumbing fixtures, electrical parts, pistons and small appliances, is also suited for anodizing and other electro - chemical immersion processes. It reportedly has been used satisfactorily in alodine processing of aluminum, silver plating, dichromate processing, tin immersion, and copper, zinc, nickel, brass and chrome plating.

Frederic B Stevens Inc, 1800 Eighteenth St, Detroit 16, Mich

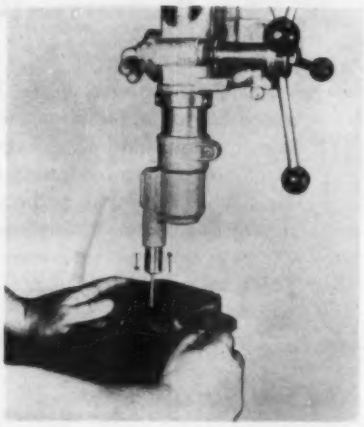


Large Model Radius Dresser Is Accurate to 0.0002 in.

Somerset "Giant" shapes and dresses large-diameter grinding wheels, concave, convex, or combinations of both. It can also be used on small bench surface grinders.

Unit will dress a 20-in.-dia wheel up to 2-in. thickness. It can also be used on cylindrical grinders. Because wheel is dressed from below, abrasive wheel guard need not be removed. Stop pins allow complete adjustment from 90° through 180°.

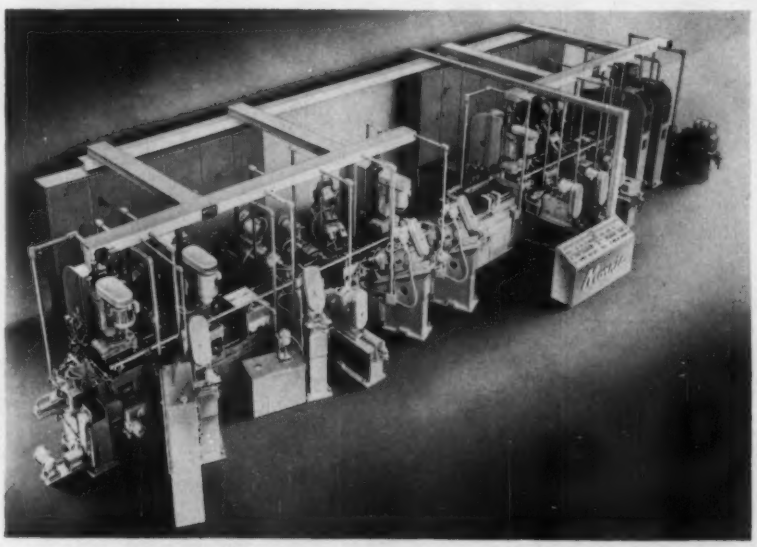
Somerset Tool Co, Virginia St, Hillside, NJ



RECIPROCATING CONVERTOR turns any drillpress using chuck taper spindle into all-purpose machine. Made of Durametal and equipped with ball bearings, Model RC comes in 1-in. and 1¾-in. stroke types, and can be used for any operation requiring accuracy in vertical sawing, filing or slotting—*Hunter Tools, Box 564, Whittier, Calif*

Inch-millimeter conversion chart permits conversion of fractional inches into decimals and millimeter equivalents at a glance. Free chart also shows conversion of decimal millimeters into inch decimals.

Opto-Metric Tools, Inc, 137 Varick St, New York 13, NY



AUTOMOTIVE CARBURETOR BODIES are machined at the rate of 1 every 7½ sec on in-line transfer machine, which incorporates 25 standard units made by company: 14 No. 1 Cam-matic, 7 No. 2 Cam-matic, and 4 Air-Oil-Matic Morris drill units. These perform 31 drilling, 19 boring, 10 reaming, 4 gaging, 13 probing, and 13 tapping operations. Machine processes 480 parts per hr, involving 56 stations—*Morris Machine Tool Co, 933-16 Harriet St, Cincinnati 3, Ohio*

The ONLY Turret Lathe with a fully automatic thread-chasing cycle!

Here is full turret lathe versatility and a threading attachment with a fully automatic cycle — all in one machine. Now you can be sure of concentricity of threading with other lathe work, *all done in one chucking*, with the time saving of the Auto-Threader! Nowhere else in the world can this be found on a turret lathe.

This Auto-Threader will chase straight or taper threads — or a combination — internal or external, from the front of the machine.

Concerning this J&L development, a customer writes: "We are tripling production on many of our items."

Write for descriptive folder No. 5440. JONES & LAMSON MACHINE COMPANY, 502 Clinton Street, Springfield, Vermont.

JONES & LAMSON TURRET LATHES

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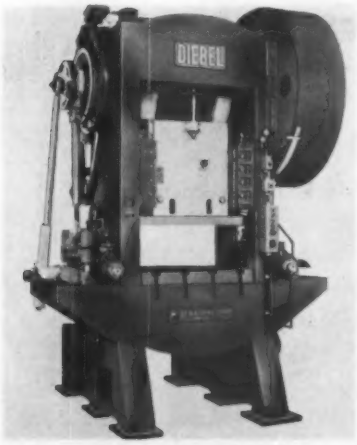
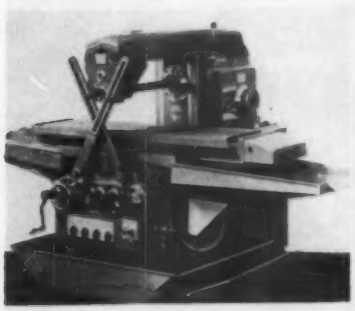


150-Ton Automatic Press Is Added to Diebel Line

Engineered to handle lamination work, progressive blanking and forming and large blanking work, 150-ton press has been added to company's line of Hi Production automatic presses. Standard equipment includes cylindrical ram, increased bearing surfaces, air clutch and spring-applied brake, special shock mounts, and safety shut-off devices. A full recirculating lubrication system for all main bearings and the slide is also included as standard equipment.

Main specifications: left to right by front to back, 40-32 or 56-32 in.; width of feed, 18 in.; length of feed, 0 to 13⅝; speed range, 70 to 210 spm.

Di Machine Corp, Dept A, 2710 W Irving Park Rd, Chicago 18, Ill

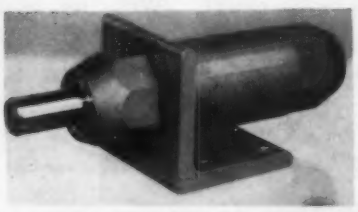


Horizontal Miller Can Handle Large Castings and Forgings

Loewe Model FH 5 FS horizontal milling machine, a product of West Germany, is adaptable to all current production methods: conventional milling, climb milling, alternate milling, jump feed, automatic cycling. Machine has a wide selection of feed and speed ranges, a 3-direction automatic table movement, single lever control and a table surface of 14 x 59 in.

Spindle drive features a 10-hp motor, while the feed drive has a separate 2-hp motor.

Imported by Eric R Bachmann Co, Inc, 27-11 41st Ave, Long Island City 1, NY

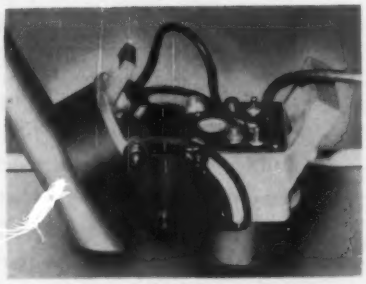


Impact Device Simplifies Marking, Light Piercing, and Riveting

Attachment called Impact-Tool mounts at any angle on drillpresses, special machines or arbor presses and operates on line pressure as low as 20 psi.

Designed for identification marking, light piercing, staking and riveting, device has only one moving part, and can be actuated electrically by solenoid or manually by poppet valve.

AirImpac Co, 920 Walnut, Flint 1, Mich



MAGNETIC WELDING FIXTURE called Mag-Tool holds ferrous metals in position for welding at any angle without preliminary setup time. It handles large or small pieces, is entirely portable and requires only one operator. Fixture is available in 3 models with max capacity of over 1 ton—*Magnetic Tool Corp, 1955 Lafayette St, Santa Clara, Calif*

Air-operated lever closer for use on Wade machines is operated by an air-cylinder plunger, controlled by electric valves and tied to a simple mechanical linkage. Lever-closer fingers are actuated by a ball bearing, and operating pressure is controlled by a pressure gage. At the present time, closer is available only for company's new machines, and must be installed at the factory.

Wade Tool Co, 49 River St, Waltham 54, Mass

JET-ENGINE VANE ROOTS are ground automatically on 3-slide grinder equipped with 4 grinding wheels mounted on 3 spindles. Two spindles each carry a single wheel, third spindle carries two wheels. Three wheels have 15-in. dia, fourth wheel 20-in. dia. Each slide is equipped with company's diamond dresser, which shapes wheels as part of the automatic machine cycle. Slide movements include rapid approach, adjustable fine feed, and adjustable spark-out period—*Ex-Cell-O Corp, 1200 Oakman Blvd, Detroit 32, Mich*

Speedy, Accurate Inspection at a Glance!

Jones & Lamson Optical Comparators are unexcelled for toolroom, laboratory and production-line inspection and measurement work. They precisely measure height, depth, lead or spacing, as well as angles to degrees and minutes. By comparing intricately contoured parts with a master outline, they measure the amount of error. J & L Comparators are versatile and flexible — perform a variety of inspecting and measuring functions. Moreover, they are convenient to operate, easy to set up, and read direct without computation.

In regard to this typical application, shown below, Modern Corporation, Detroit, says "Modern Corporation's 30-inch J & L Comparator has become the key instrument in the inspection of fine MODCO tools . . . protects quality prestige . . . customers' rejections kept very low . . . saves $3 to $5 per hour when used on large tools."

Send for our latest Comparator Catalog. JONES & LAMSON MACHINE COMPANY, 502 Clinton Street, Springfield, Vermont.

JONES & LAMSON COMPARATORS

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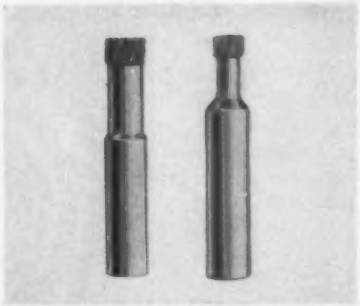
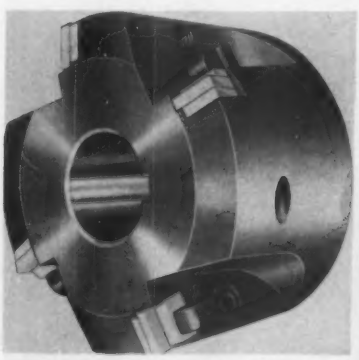


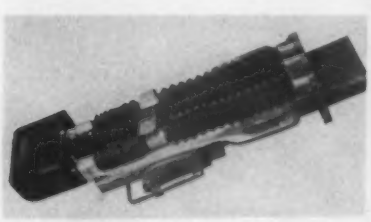
Miniature Hole-Grinding Burs Added to Atrax Line

Miniature burs, series 1903, are designed for grinding small holes in steel up to Rockwell C-64. Tools remove, with only a few passes, up to .006 and .008 in. of stock with a finish of 2 microinch or better. Recommended speed is 100,000 rpm or higher. There are 17 different tools in series, all on ⅛-in. shank.

Atrax Co, Newington, Conn



KENDEX BORING HEAD for boring engine cylinders utilizes four ½-in.-sq. Kennametal turn-over button inserts that have eight indexable cutting edges each. Kennametal shims assure positive insert seating — *Kennametal Inc, Latrobe, Penna*

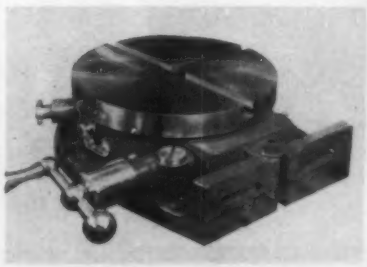


Buffing Compound Applicator Is Air-Operated, Automatic

Model 1006 can apply full 10 in. of compound without resetting or adjustment. Lightweight construction, less than 24 lb, permits installation on floating heads without disturbing balance.

Unit can feed any number of strokes per minute, applying compound only when required. Up to eight applicators can be operated simultaneously from a single controlling valve. Rate of feed is adjustable from 0.0015 to 0.015 in. per stroke. Details in bulletin P-1000.

George L Nankervis Co, 15300 Fullerton Ave, Detroit 27, Mich



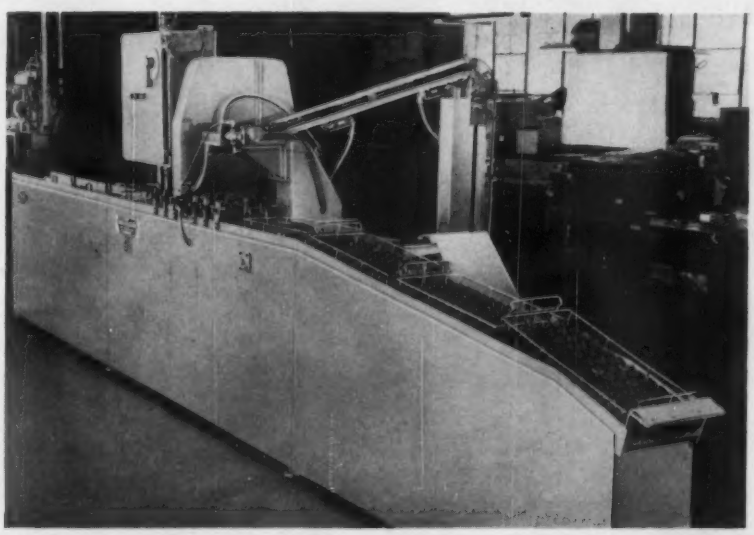
Two-Position Rotary Table

Base of 12-in. table allows both horizontal and vertical operation. Center-hole runout is guaranteed to be no more than 0.0005 in.; parallelism through 360° of rotation, 0.0001 in.

Unit's over-all height in horizontal position is 5 in., length is 15¼ in., width, 14 in., weight, 140 lb. Dial is graduated in minutes, table in degrees. One turn of the dial gives four degrees of circular motion of the table.

Universal Vise & Tool Co, Parma, Mich

DOUBLE END BENDER, called Multiform Big Brother, produces multi-angled channels, in widths from 2 to 6 ft. This hydraulic machine is operated by a 10-hp motor, and has pushbutton controls. Automatic production cycle requires 15 seconds. Unit can be equipped for double-end bending of any kind or shape of material—*J A Richards Co, 905 N Pitcher St, Kalamazoo, Mich*



CENTER-BORED PINIONS are automatically basketed at rate of 3000 pieces per hr by custom-tailored basketing unit which is made of standard components. Parts are fed to dropping mechanism through enclosed track using chain lifts and gravity flow. Parts drop onto upright prongs a row at a time, release being actuated by automatic indexing of basket. Series of roller guides and limit switches position basket on chain conveyor. Double or triple dwell is available if stacking of gears is desired—*Gear-O-Mation Div, Michigan Tool Co, 7173 E McNichols Rd, Detroit 12, Mich*

Gives Versatility . . .
Fast Change-over . . . Micro-Size Control

Typical of J&L thread tool products is the MC Collapsible Tap (illustrated here) for use on either stationary or rotating jobs. This one complete tap, plus parts, gives five sizes of taps ranging from 1 5/16" to 3 1/2".

Jones & Lamson's recent purchase of the Modern Tool Works, Rochester, N. Y. greatly broadens J&L's service in the thread tool field. Now, from the operators of the world's most modern thread tool plant, you can get complete lines: die heads and chasers; accessories and sharpening equipment; plus a line of collapsible taps and chasers, solid adjustable taps and chasers, the Modern-Magic Chuck, and the Modern Stud Setter. Complete engineering service is available for the entire line of products.

Send for Thread Tool Catalog. JONES & LAMSON MACHINE COMPANY, 502 Clinton Street, Springfield, Vermont.

JONES & LAMSON
THREAD TOOLS

Turret Lathes • Fay Automatic Lathes • Milling & Centering Machines • Optical Comparators • Thread Tools

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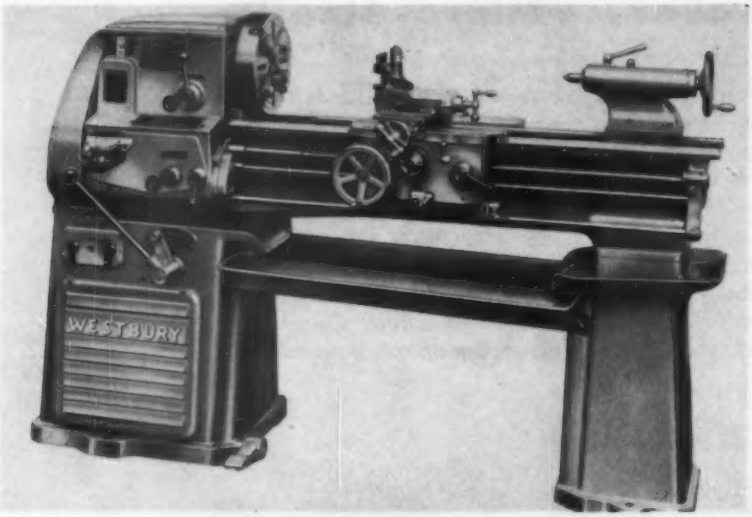
Thread & Form Grinders

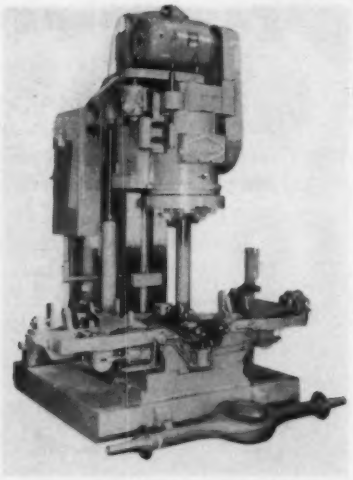


Westbury Lathe Has 12-in. Swing, 32-in. Distance Between Centers

Westbury 12-32 toolroom lathe, made in Italy by Maserati, features a 12-in. swing over bed, 17¾-in. swing in gap, and a 32-in. distance between centers. Other features include anti-loosening device for spindle nose, hardened and ground headstock gears, V-belt drive, and foot brake.

Front spindle bearing is bronze and has adjustable wedges; rear spindle bearing is combination radial and thrust bearing. A Norton gear box is optional.

Imported by Maserati Corp of America, Westbury LI, NY



BAKER BASIC MACHINE makes even cut across face of rear axle housing. Hydraulic clamping fixture holds both ends of housing; gage locates center, swings out of way, and facing begins. Equipped with cross feed facing head, machine handles four different size housings, and reportedly turns out 34.2 pieces per hr at 100% efficiency. Machine can be completely automated, and can be adapted to boring, drilling and tapping by simply changing heads—*Baker Brothers, Inc, Toledo 10, Ohio*

B & S Gage Blocks Available In Economy Priced Line

Johansson Thrift Blocks have an accuracy and parallelism of ±.000008 in. with a surface finish maintained from 1.0 to 1.5 mu-in. RMS. Flatness is within .000006 in. They are economy priced and give Class B block accuracy.

Two sets are available: one containing 84 blocks; the other, 36 blocks. Each set is furnished in wood case. Individual blocks and chromium carbide wear blocks are also available.

B & S has also marketed a complete Apprentice Tool Chest containing 21 precision tools.

Brown & Sharpe Mfg Co, Providence 1, RI

Unit will handle work up to 36 in. long and 10 in. in dia with standard tailstocks. Used with V-block accessory, any length of work with diameters from ½ to 6 in. can be checked. Instrument is approximately 59 in. long, 24 in. wide, 51 in. high. Power source is 110v, 60c ac.

Sheffield Corp, Dayton 1, Ohio

Electronic Lead Measurer Permits Closer Tolerance Inspection

Electronic Leadchek for detecting lead error in straight and tapered work and rack teeth is available with drift-free dual electronic amplification of either 1000/2000 or 2500/5000 to 1. Amplification within each dual range can be switched from one to the other without realignment of indicating meter mechanism. Where amplification is 5000:1, direct readings on the zero center equilinear scale can be made to 0.00001 in.

TCF THREAD CUTTING FASTENER, designed to hold die-cut or cold-forged nameplates, emblems, and trim against sheet metal surfaces, can be used for other applications that require a spring take-up fastener. Available to fit ⅛- and 3/16-in. studs—*United-Carr Fastener Corp., 450 Main St., Cambridge 42, Mass*

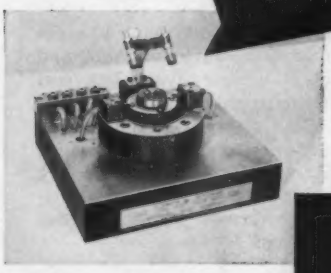
Portable pipe benders, designated One Shot, bend 8-in. pipe, and larger sizes, up to 90 deg in one setting. Frame can be folded together for transportation. Similar benders available in smaller sizes. Attachment for making 180 deg bends in one shot is also available.

Tal Bending Equipment, Inc, 417 N Water St, Milwaukee 2, Wisc

Speed Inspection
OF PRODUCTION PARTS!

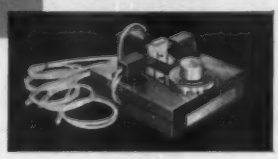
NEW **DEARBORNAIRE**

MULTIPLE COLUMN AIR GAGING INSTRUMENTS



Special Air Gaging Fixtures designed and built to meet your particular application requirements. Complete engineering service available upon request.

Send part print showing all dimensions to be checked and tolerances required for prompt quotation and delivery.

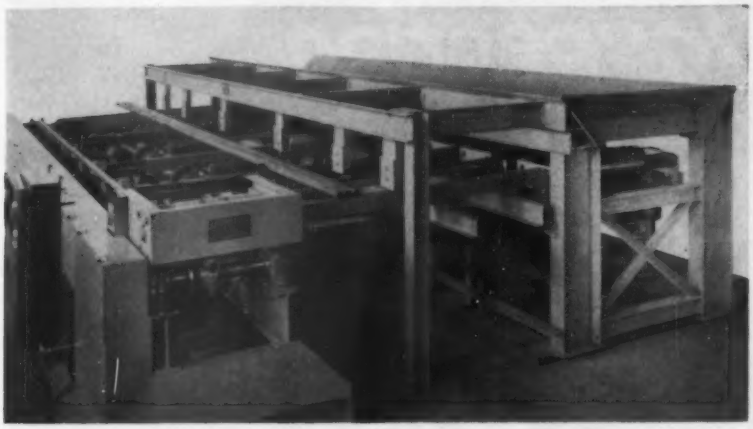


To speed inspection of production parts, new Dearbornaire air gaging instruments are now offered in multiple column units designed to permit more accurate simultaneous checking of as many dimensions as may be required for a given part. What's more, each unit incorporates all of the advanced design features which have made Dearbornaire the most practical, most versatile column type instrument ever produced . . .

- New higher rated pressure system and built-in circuit restrictions make them virtually self-cleaning, reduce maintenance to a minimum.
- New glass tube has a characterized internal taper which provides positive linear accuracy over the full extent of the calibrated scales.
- Easy-to-read Zero-centered scales permit use of instrument for normal inspection, statistical quality control, and as a tool setting gage.
- Interchangeability of component parts simplifies conversion from one amplification to another, reduces spare parts inventory costs.

Plus a complete line of air gage spindles, rings, snaps and cartridges all precision finished to give you greater accuracy, longer wear life. Free demonstration arranged upon request. Write for details today!

AIR GAGE DIVISION
DEARBORN GAGE COMPANY
22038 Beech Street • Dearborn, Michigan



Automatic Bar and Tube Feeder Serves Shears, Furnaces, Presses

The Spurgeon Automatic Bar Hopper Feeder consists of three sections: the hopper, right, designed to receive bundles of bars or tubes from overhead cranes; transfer table, center, that transfers and meters pieces from the hopper to the conveyor; and the powered V-roll conveyor, left, that feeds pieces to the forming operation or furnace.

Bars are dragged across the transfer table by cross-chain conveyors. The bars are limited to a single layer in depth by a series of metering hands above the table. Escapement fingers hold bars until conveyor signals that it is ready to accept next piece. Feed rate of bars on the conveyor is set so that forming machine can operate at full capacity.

Model illustrated is designed to handle 10,000-lb bundles of 2-in. diameter x 20-ft-long bars or tubes.

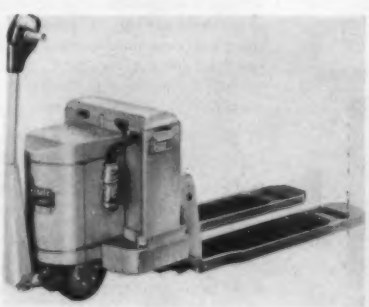
Spurgeon Co, 23501 Hoover Rd, Van Dyke, Mich

Wallace-Northrop Duplicating Bender for Thin-Walled Tubing

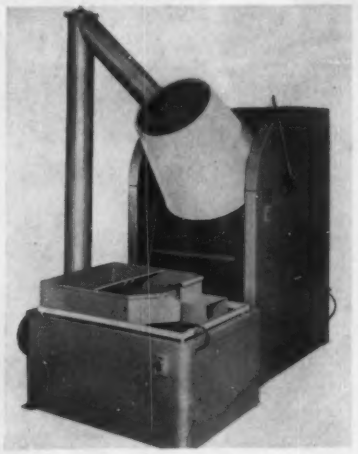
Operating solely on compressed air, this bender will duplicate any bend from a templet. Three ball and socket units enable a double backstop to be placed in any required position for locating one end of a tube at beginning of series of operations and then locating the same tubing in the vicinity of a previous bend for completing the several steps required on the part. Foot-operated pneumatic valve controls ball and socket units.

After a tube has been bent to requirement of templet, all subsequent tubes are bent without need for checking each individual bend. Interchangeable bending head assemblies are available to suit different size tubing and bending radii. Unit was developed by Northrop Co.

Wallace Supplies Mfg Co, 1304 Diversey Pkwy, Chicago 14, Ill



LIFT TRUCK, model KPW, designed to give greater floor clearance, reduces pallet damage. To lessen damage occurring when operators fail to completely lower forks, this model has automatic lowering device that gradually lowers pallet load to floor. When weight is removed, forks drop immediately to lowered position—*Lift Trucks, Inc, 2425 Spring Grove Ave, Cincinnati 14, Ohio*



Hot Sawdust Units Added to Speed-D-Burr Barrel Finishing Line

Hot sawdust drying and polishing units are available in three models (deluxe, standard and economy) and may be had as a barrel unit only, as barrel unit with elevator refill (photo) or as barrel unit with standard mechanical separator.

Barrel is same for all models—heat jacketed, all welded construction, 24 x 24 in., 5-cu-ft capacity. Standard power unit is ¼-hp, 110-v, single phase gear-motor with switch and gas venturi. A smaller capacity model—1.2 cu ft—is also available.

Speed-D-Burr Corp, 3613 San Fernando Rd, Glendale 4, Calif

Seamless steel tubing made to close ID tolerance is now available and provides a comparatively low cost material for production of honed cylinders. Cold drawn product can be specified to conform to tolerances for both ID and OD. Sizes range from 2 to 9 in. OD.

Joseph T. Ryerson & Son, Inc, Box 8000-A, Chicago 80, Ill

VACUUM-LIFTING DEVICE, Air-Lift, can raise up to 200 lb. Release valve is actuated by thumb pressure—*International Staple & Machine Co, Materials Handling Div, Herrin, Ill*

Bodine

CASE HISTORY NO. 43

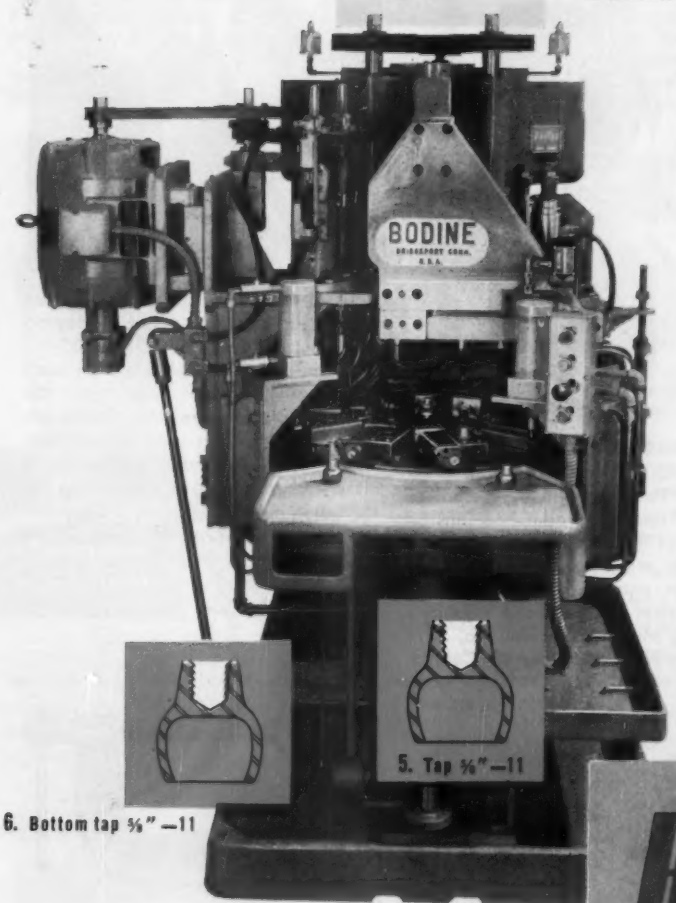
a high production success on a "heavy duty" job

Here's an interesting example of how the "extra capacity" built into a Bodine machine can sometimes be put to work very profitably. Ordinarily, ½" drill and tap capacity in steel is maximum for the Bodine 48-30, but in this case we are successfully handling 17/32" drills and ⅝"—11 taps in an SAE 1025 steel forging on a high production schedule.

Bodine Basic design provides the ample rigidity and mounting space requirements for separate high-power drill and tap spindle drives. Special centralizing clamping fixtures take care of the difficult work-holding problem.

Once again, this proves that the best way to approach any difficult production or combined production-assembly problem of this kind is to call Bodine first.

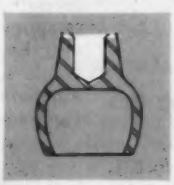
6 operations
600 pieces/
50 min. hr.



1. Spot drill and chamfer

2. Drill 17/32" —¾" deep

3. Bottom drill 17/32" —¾" deep



4. Face top

5. Tap ⅝"—11

6. Bottom tap ⅝" —11

THE **Bodine** CORPORATION
BRIDGEPORT 5, CONNECTICUT

AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

Write Dept. AM-3 for further information.

28D57

Davis Precision Gage Checks Hard-to-Gage Roll Dimensions

Roll-Chek gage provides a fast, positive means of checking roll dimensions. On countersink flush-pin gages, roll dimensions reportedly may be checked in less than 3 min. All types of rolls may be checked, including pins and taper gages.

Gage is offered with or without sets of steel rolls. Price of gage alone is $280.

A G Davis Gage & Engineering Co, 21435 Dequindre Rd, Hazel Park, Mich

Mico Heavy-Duty Pantograph Has Six Reduction Ratios

New heavy-duty pantograph, No. 624, is designed for heavier work and for more continuous use than standard model. It is recommended when performing routing and milling operations in steel.

Ratios of 1.5-to-1 to 4-to-1 permit engraving six sizes of characters from a single master. Features include positive coupling of pantograph arms, tapered spindle assembly, and a 1/10-hp, 115-v ball-bearing motor. Full line of accessories is available.

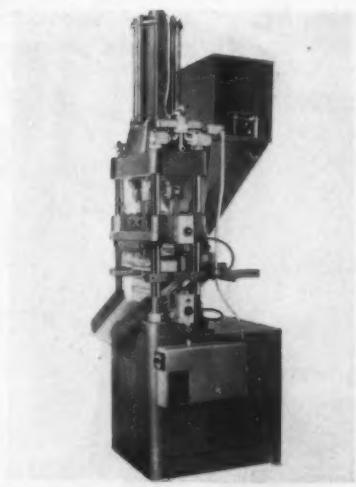
Mico Instrument Co, 80 Trowbridge St, Cambridge 38, Mass

Bound Brook Sintered Iron Features Easy Machinability

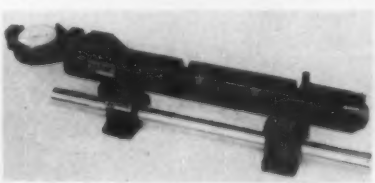
Pure sintered-iron material called Powdiron FM, said to be inexpensive and readily available, overcomes some of the problems connected with the machining of sintered iron. Material reportedly can be machined to a clean, mirror-like finish, comparable to mild steel.

Company reports that cost of material has been held down by not adding copper to the material, a procedure usually necessary to get decent machinability from sintered iron. Product is said to have high ductility.

Bound Brook Oil-Less Bearing Co. Bound Brook, NJ



COMPRESSION MOLDING PRESS, Automold A50-B, produces 50 tons pressure on a reduced air-line pressure of 100 psi. Press will produce 60 tons on pressure of 120 psi. A re-design of company's previous model, press has also been equipped with a 3-roller toggle system for increased stability—*Automatic Molding Machine Co, 3217 Exposition Pl, Los Angeles 18, Calif*

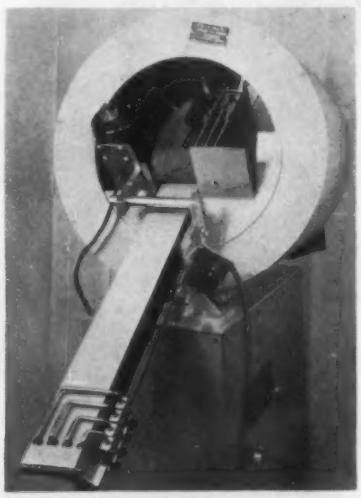


One-Side Controlled Master Gage Checks ID or OD Settings

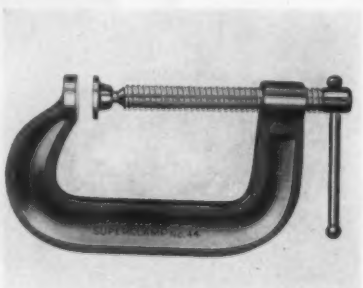
Unit, designated Model 200 Set Master Gage, is designed to accommodate settings of OD's from 3½ to 18 in., ID's from 0 to 15 in. Both are controlled by a sliding contact button which also permits use on special shaped contacts such as datum checks.

Only a key or wrench is required to bring it to zero. If desired setting is missed, operator simply backs the one-side control up and approaches again.

Acrament Gage Co, 45 Willard Ave, Providence, RI

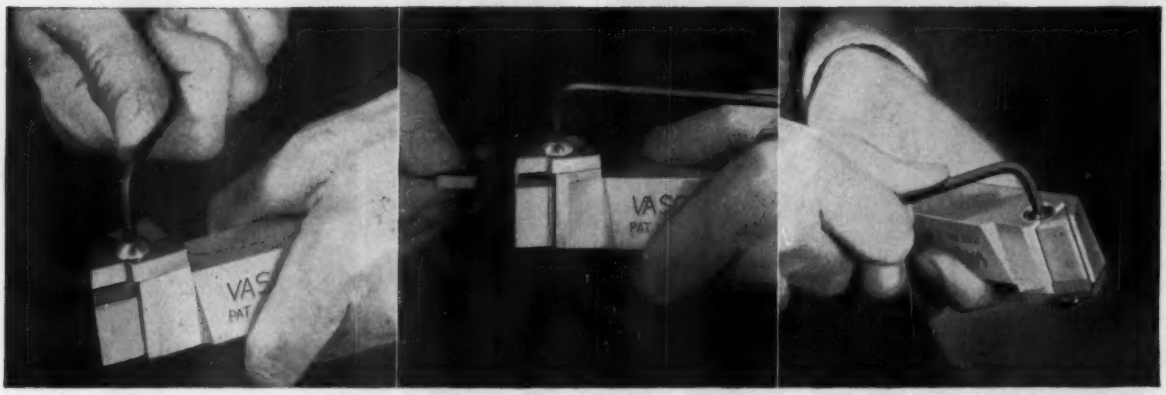


SPECIAL PARTS FEEDER, a modification of company's Feed-A-Matic, is adapted to feed 4 rows of No. 12 x 29/32-in.-long studs. Four studs—one from each track—are released each time the solenoid-controlled release mechanism is actuated. Unit is used in combination with an automatic stud setter to insert the studs into a die casting for the automotive industry—*U S Engineering Co, 40-24 22nd St, Long Island City 1, NY*



C CLAMPS, No. 44 Superclamp Twins, are furnished with sliding pin handle unless steel wing handle is specified—*Cincinnati Tool Co, Cincinnati 12, Ohio*

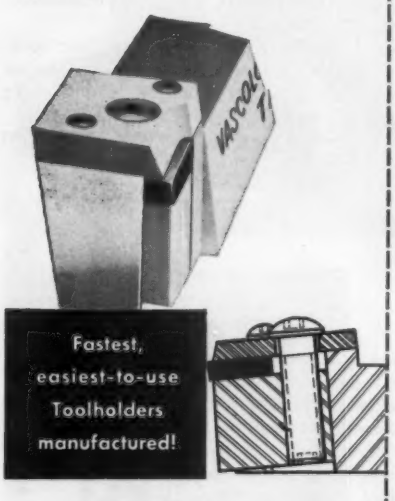
How V-R Toolholder Design Reduces Costly Downtime



1. Insert is clamped in position or released by a turn of the main screw which raises or lowers the exclusive V-R elevator... the single moving part. Nothing to fall out or fumble with.

2. Insert is indexed or replaced in seconds. When you clamp the insert against the chipbreaker plate, it always comes back to the setting, regardless of the thickness of the insert.

3. The main screw is also adjustable from bottom for easy change of inserts when the toolholder is in an inverted position. Another V-R exclusive design feature.



The main screw controls the exclusive elevator. The chipbreaker plate forms the top anvil against which the insert is clamped.

TH-616

Cutting Edges Changed In Seconds . . .

User Reports 55% Production Increase

The toolholder and clamped-in carbide insert principle continues to make major savings everywhere it is applied. Here is a typical recent example:

A Rockford, Illinois, company changed from brazed tools on a turret lathe to a V-R toolholder with throw-away inserts. Grinding of carbide tools for this machine, which formerly took 2 to 3 hours per day, has been eliminated. Machine downtime, formerly about one hour per day, is now about 10 minutes. Production has been increased 20 to 25%!

V-R toolholder design has carried the toolholder principle to maximum effectiveness. A single main screw is the only adjustment. Chipbreaker plates are available ground to a standard chipbreaker width or to a specified width at no extra cost. They are also available with zero chipbreaker width for the customer to grind to his own specifications.

All toolholder parts are interchangeable and replaceable.

Both negative and positive rake holders are available to handle 90% of jobs that can be handled by brazed tools.

On job after job, V-R toolholders have proven to cost less to use than brazed tools or any other toolholder. Investigate—get the facts.

Ask for CATALOG VR-437

Call your V-R Representative or Distributor, or write:

Vascoloy-Ramet Corporation

868 Market St. Waukegan, Illinois

SUBSIDIARY OF FANSTEEL METALLURGICAL CORPORATION

MANUFACTURERS OF CEMENTED CARBIDES, TOOLHOLDERS and TANTUNG® CAST ALLOY CUTTING TOOLS.

Makes tough ones *EASY* — and easy ones *SURE!*

THE PROFILOMETER® makes it easy to measure the roughness of nearly *all* machined and finished surfaces, no matter where they are located. It *shows* the roughness, on a meter, in standard *microinch units.* And it gives *consistent, accurate readings* for any surface from polished glass to rough-machined forgings — regardless of the place, the time, the operator, or the equipment used.

As you can see, the Profilometer is a SHOP TOOL, and can be used wherever desired. It is fast and simple to operate (needs no special skill or experience) — is built for hard service — and is reasonably priced. It is *standard equipment* in *thousands* of production and inspection departments, throughout the world.

FREE ILLUSTRATED BULLETIN gives details, and describes *cost-saving applications.* Write for it!

OTHER MICROMETRICAL PRODUCTS include the PROFICORDER® (for obtaining magnified surface profile records); WAVOMETER® (for measuring waviness around surfaces of rotation); ANDEROMETER® (for measuring the over-all quality of assembled ball bearings). Illustrated bulletins on request.

Representatives in principal industrial centers throughout the Free World

Names of above products are registered trade-marks.

MMC MICROMETRICAL MANUFACTURING COMPANY

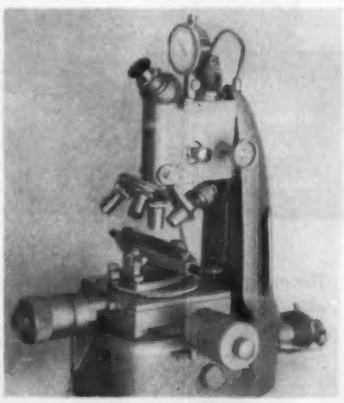
351 S. MAIN ST. ANN ARBOR, MICHIGAN

Lexco Hydraulic Lift Table Has 500-lb Capacity

Designated Lexco 500, hydraulic lift table is 30 in. long, 20 in. wide, and 30 in. high. An 18-in. rise brings over-all height to 48 in. Construction is all steel, and unit is mounted on two 5-in. rigid casters and two 5-in. swivel casters for easy maneuverability.

Table is equipped with floor lock, controlled by footpedal, to anchor it in position when in use. Weight is about 135 lb. Price is $149 fob.

Lexco Engineering & Mfg Corp, PO Box 161, Colmar, Penna



Toolmakers Microscope Adaptable For Metallurgical Examination

Unitron Model TM can be used for precise shop measurements and for high-power examination of metal grain structure. Magnification is 30 to 400X (higher with aid of accessory optics). Instrument gives direct readings to 0.0001 in. in three di-

"RODGERS PLATEN PRESS GIVES US

FAST CYCLING WITH COMPLETE SAFETY"

—SAYS VEIT AND YOUNG

Rodgers 400-ton platen press in use at Veit and Young, Huntingdon Valley, Pa., metalworking specialists. The press is equipped with die cushion, fast cycling cylinders and other accessories. Some of the products formed are stacked by the press.

Higher, more consistent press cycling rates are maintained by Veit and Young press operators with the safety controls used on their Rodgers Platen Press. Complete operator-confidence in these safety controls means they can concentrate on speed and accuracy! At Veit and Young's Huntingdon Valley, Pa., plant they're working with type 303 stainless steel, brass, carbon steel and aluminum. Stock thicknesses range from 1/32" to 1/8" with bends up to 90°. Production has increased in the drawing and forming of large serving trays and electrical panels.

Fast cycling of this Rodgers Platen Press is made possible by auxiliary cylinders. They lower the big platen quickly to the die contact—raise it equally fast after die disengagement. Forming pressures can be pre-set from 80 to 400 tons. Holding pressures on the pneumatic die cushion range up to 50 tons! Veit and Young changes dies in an hour or less.

Rodgers Electro-Hydraulic Control System governs all platen, pressure and time cycles with simple, fast adjustments—for increased output! If you work in metal, plastics, rubber, veneers,—you can mold—draw—form *faster* with a Rodgers Platen Press. Capacities 10 to 600 tons, with plain or heated platen, up or down action, controls and accessories to suit your needs. Tell us your production requirements and send for Rodgers "Blue Ribbon" Platen Press Catalog.

HI-PRESSURE Rodgers HYDRAULICS

Rodgers Hydraulic Inc.

7407 WALKER STREET • MINNEAPOLIS 26, MINN.

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—as attained with any of the 7 SIP JIG BORERS and SIP OPTICAL JIG BORING, MILLING and MEASURING MACHINES—will furnish your plant with the permanent means (1) to define, establish and maintain the highest possible precision standards in your manufacturing processes, so as (2) to improve your quality-of-output and economy-of-operation. These and other profit-advantages are interestingly demonstrated in the film offered below.

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AMERICAN SIP CORPORATION
100 East 42 Street, New York 17, N. Y.

Please arrange, with no obligation, for a free group showing at my plant of your 25 minute, 16mm. sound film, "Production with Precision."

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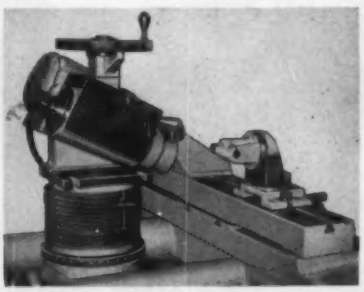
mensions by means of large micrometer drums which move the stage, and dial indicator that measures depth by optical contact with specimen.

Additional features are three separate light sources for substage, overhead, and vertical illumination; combination rectangular ball-bearing stage and circular rotary stage; inclinable toolholder; revolving nosepiece with objectives: 3, 10, 40X, and cross-line 10X eyepiece. Price, including cabinet, is $1050.

Unitron Instrument Div, United Scientific Co, 204-206 Milk St, Boston 9, Mass



Tilting Spindle Adds Versatility To Tool and Cutter Grinder

Direct, positive setting of clearance angles on this 25 deg tilting spindle on the Sterling G-2 Tool and Cutter Grinder is said to speed set-ups and insure more accurate grinding. Because the angle is set by tilting the spindle it is not necessary to change setting for different diameters of work.

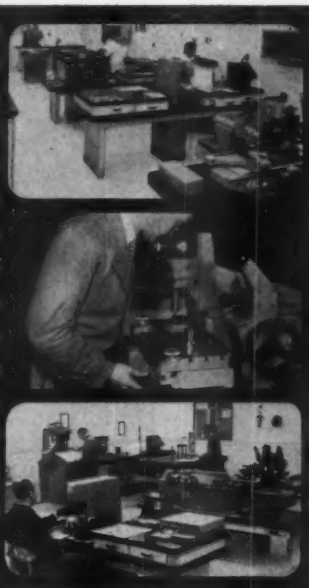
In addition to tilting 25 deg at one end and 15 deg at the other, spindle is reversible and rotates 360 deg. Machine has 10¾-in. swing.

McDonough Mfg Co, Eau Claire, Wis

Remotely Controlled Bristol System Transmits and Receives Motion

Remote positioning system for transmitting motion with appropriate power output is composed of three basic components: transmitter, amplifier, and receiver. Any form of motion can be transmitted or received, either linear or rotary.

System has been designed for maximum reliability and will operate under any statistically reasonable failure or will remain in position. Power supplies of amplifier and receiver need not be identical; amplifier requires 115-v, 400-cps supply,



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has developed from more than 90 years' specialization with practical metrology. The resulting SIP techniques—as used in length measurements by national Bureaus of Standards—may be most profitably applied with SIP UNIVERSAL & LINEAR MEASURING MACHINES, SIP high precision MICRO-INDICATORS, and SIP PROFILE PROJECTORS. How well these techniques and machines can work to your advantage is illustrated in the film offered below.

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Please arrange, with no obligation, for a free group showing at my plant of your 25 minute, 16mm. sound film, "Absolute Measurements."

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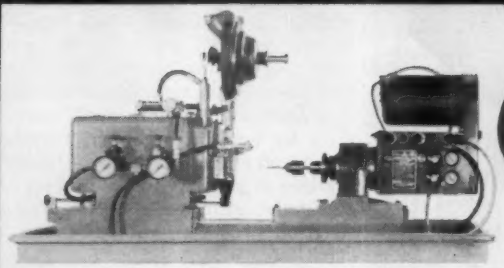
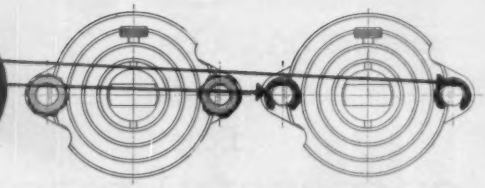
Waldes Truarc Retaining Rings Eliminate Machining and Parts—Cut Assembly Time on Drill and Tapper



Beco Model 410 Drill and Tapper

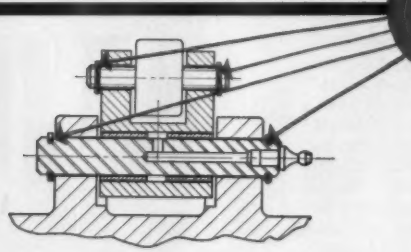
The Batchelder Engineering Co., Inc., Springfield, Vermont uses 4 different sizes of 2 different type Waldes Truarc rings in their new BECO Model 410 Automatic Drill and Tapper. Truarc rings speed assembly, reduce machining, improve design.



ALTERNATE DESIGN TRUARC DESIGN

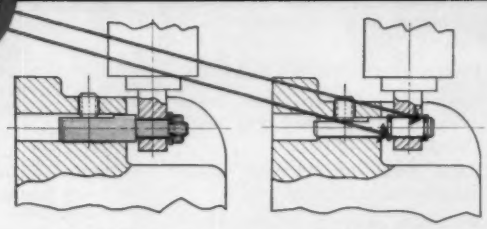
Clamp Cylinder Rod Stop Assembly

Truarc "E" Rings (Series 5133) replace stop nuts in the Clamp Cylinder assembly. They eliminate need for threading 2 rods ...the danger of cross-threading nuts...and costly rejects. Truarc Rings cut assembly time and cost.



Bell Crank Pivot Assembly

Truarc Rings (Series 5100) in Bell Crank Pivot assembly permit grease hole not possible with cotter pin fastener. Use of nuts would have increased machining and assembly costs considerably.



ALTERNATE DESIGN TRUARC DESIGN

Hopper Cylinder Anchor Pin Assembly

2 Truarc Rings (Series 5100) secure and position end of vertical air cylinder. Rings eliminate extra cost of machining 3-diameter pin, threading and undercutting...plus nut and washer. Assembly is quick and sure.

Whatever you make, there's a Waldes Truarc Retaining Ring designed to improve your product...to save you material, machining and labor costs. They're quick and easy to assemble and disassemble, and they do a better job of holding parts together. Truarc rings are precision engineered and precision made, quality controlled from raw material to finished ring.

36 functionally different types...as many as 97 different sizes within a type...5 metal specifications and 14 different finishes. Truarc rings are available from 90 stocking points throughout the U. S. A. and Canada.

More than 30 engineering-minded factory representatives and 700 field men are available to you on call. Send us your blueprints today...let our Truarc engineers help you solve design, assembly and production problems...without obligation.

For precision internal grooving and undercutting...Waldes Truarc Grooving Tool!

WALDES

TRUARC®

RETAINING RINGS

WALDES KOHINOOR, INC.
47-16 AUSTEL PLACE, L. I. C. 1, N. Y.

Waldes Kohinoor, Inc., 47-16 Austel Place, L. I. C. 1, N.Y.
Please send the new supplement No. 1 which brings Truarc Catalog RR 9-52 up to date.
(Please print)

Name .....
Title .....
Company .....
Business Address .....
City ..... *Zone* ..... *State* AM039

WALDES TRUARC Retaining Rings, Grooving Tools, Pliers, Applicators and Dispensers are protected by one or more of the following U. S. Patents: 2,382,948; 2,411,426; 2,411,761; 2,416,852; 2,420,921; 2,428,341; 2,439,785; 2,441,846; 2,455,165; 2,483,379; 2,483,380; 2,483,383; 2,487,802; 2,487,803; 2,491,306; 2,491,310; 2,509,081; 2,544,631; 2,546,616; 2,547,263; 2,558,704; 2,574,034; 2,577,319; 2,595,787, and other U. S. Patents pending. Equal patent protection established in foreign countries.

DIAMONITE offers all the essentials needed for successful machining with oxide cutting tools

Published reports on tests in numerous plants in the metal-working industry agree that there are four major requirements for successful performance of oxide cutting tools, namely:

1. Proper qualities in the tool itself.
2. Geometry, speeds and feeds adapted to the tool and work material.
3. Rigid tool support with well-distributed clamping.
4. Accurate, uniform chip control.

On the basis of these findings, Diamonite offers everything necessary for successful use of oxide tooling with a profitable pay-off of faster material removal, superior surface finish and long tool life.

- Diamonite Oxide Cutting Tools meet all requirements specified for successful performance. They are made of high purity aluminum oxide by advanced methods, resulting from more than 13 years of development and use of oxide tools. These processes have been specially developed to produce sapphire-like hardness and abrasion resistance with an ultra-strong bond unaffected by high temperatures and an extremely dense, highly-uniform, micro-fine grain structure.
- Diamonite offers charts of tool geometry, speeds and feeds based on years of practical machining experience, scientific computation and extensive research in the use of oxide cutting tools.
- The only holder especially designed for use with oxide tools, the Diamonite Superigid Tool Holder provides firm, uniform clamping pressure over a maximum area of the tool surface. It, thus, affords the rigid support and freedom from vibration essential to the use of oxide tools. It uses indexable throw-away lozenge inserts and permits micrometer adjustment of the chip breaker vital to oxide tool life and performance.
- The new Diamonite Oxide Chip Breaker, made of ultra-hard, abrasion - resistant Diamonite, will not crater and outwears other materials many times. It maintains the vital relationship between the chip breaker and tool cutting edge, assuring consistent chip control.

Your nearby Diamonite Tool Supplier has the tools and accessories and can furnish all the information you require to successfully and profitably use oxide tooling and you'll find him anxious to work with you to insure that you get best results. If you do not have his name, write for it today.

Have you ever considered using wear parts of Diamonite? Its extreme hardness and wear resistance assure extra long life and lowest end cost. Custom shapes can be made to your specifications. Send prints for quotation.

DIAMONITE products manufacturing company

pioneers in the development of oxide cutting tools

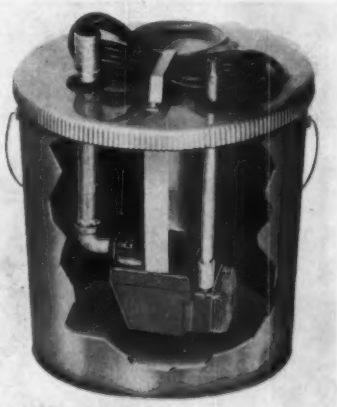
Canton 2, Ohio

but receiver motor can operate on practically any power supply available.

Accuracy of system is independent of load, because receiver motor gets full voltage for any error signal exceeding the deadband, which may be as low as 0.2% of scale. Manual over-ride, inching control, and interlock features are available as options.

Applications include such operations as fuel mixture and throttle control on engine test cells, valve operations in process work, and remote manipulation in hazardous locations.

Bristol Co, Waterbury 20, Conn



Portable Coolant Unit Has Submersible Recirculating Pump

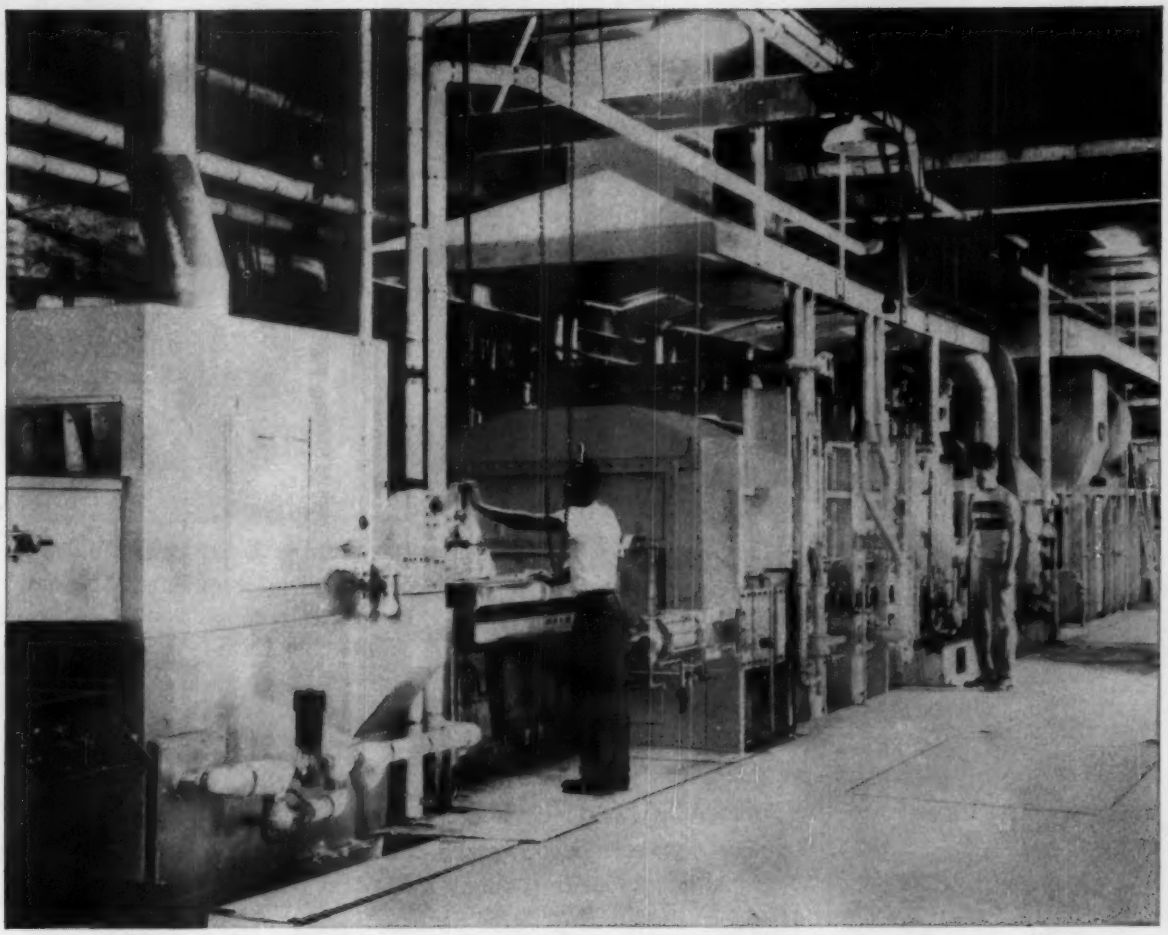
Little Giant coolant unit features a recirculating pump that can be submerged in coolant, free from exposure. Pump has die-cast aluminum body, hermetically sealed in oil. Coolant unit operates with either water-soluble or oil-base coolants, and has a newly designed filter trap.

Unit is available in three Models: Model 2, 200 gph max; Model 3, 400 gph max: and Model 4, 475 gph max, Standard operation is from 110-v, 60-c line; 220-v models available.

Little Giant Pump Co, Div of Little Giant Vaporizer Co, Inc, 5101 Classen Blvd, Oklahoma City, Okla

Air cylinder, model 091 Non-Repair, is single-acting spring-return type for clamping, moving, holding, ejecting. Vinyl U-cup mounted in aluminum-alloy piston slides within stainless steel body. Unit will exert force equal to 0.9 of air line pressure for maximum stroke of 1 in. Lock nut secures cylinder to mount.

Bimba Hardware & Mfg Co, 101 Main St, Monee, Ill



Production increased 500% with automatic harden-draw lines

Many things improved when two of these Surface lines were installed by a fastener manufacturer: production (up 500% over previous methods), delivery time, and product quality and uniformity. Either large runs, up to 50,000 fasteners, or small batches of special parts are processed economically. All operations—weighing, loading, first wash, clean hardening, quench, second wash, draw, and rust-proofing—are tied together by timed conveyors and feeders. Surface RX® generator gas permits carburizing as well as clean hardening.

This is one of many demonstrations that Surface automatic heat treating can help you get the most for your production dollar.

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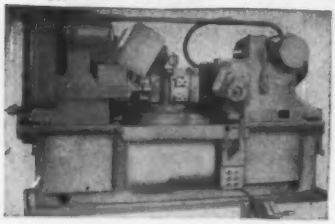
Surface® Heat Treat, Steel Mill, Glass Divisions • Kathabar® Air Conditioning Division
Janitrol® Heating and Air Conditioning Division • Janitrol® Aircraft-Automotive Division

Surface®
HEAT TREATING EQUIPMENT

GOSS and DE LEEUW
AUTOMATIC CHUCKING MACHINE



means a complete piece... at each index cycle

When a piece is finished it is *completely* finished without the necessity of a second operation. Furthermore, it means *more* finished pieces in a given period of time and greater accuracy in *every* finished piece.

The "1-2-3" Method is exclusive with Goss & DeLeeuw. With it, three ends of a piece can be machined at a single chucking of the work, simultaneously or in sequence depending on the operations involved. It will pay you to investigate.

Send for illustrated literature giving detailed information. Send samples and ask us to give you cost estimates of handling this work on a "1-2-3" Goss & DeLeeuw Automatic Chucking Machine.

GOSS and DeLEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

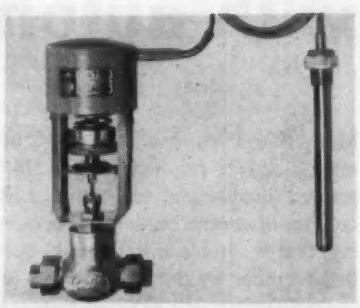
Ohlsson & Rice Power Torque Wrench Senses Thread Tightness

After being set for a given torque, the new O & R wrench starts run-down of screw without impacting or ratcheting. During continuous run-down, it senses the tightness, or resistance, of the screw thread or other resistance and adds that same value to final torque setting.

Reportedly the device is so sensitive that where the screw is tight at first, but becomes loose just before final torqueing, it readjusts to subtract the value added during tight part of run-down.

Wrench units are available as complete hand-held power tools; units adaptable to drill press; and multiple mounting in gang arrangements.

Ohlsson & Rice, 3340 Emery St, Los Angeles, Calif



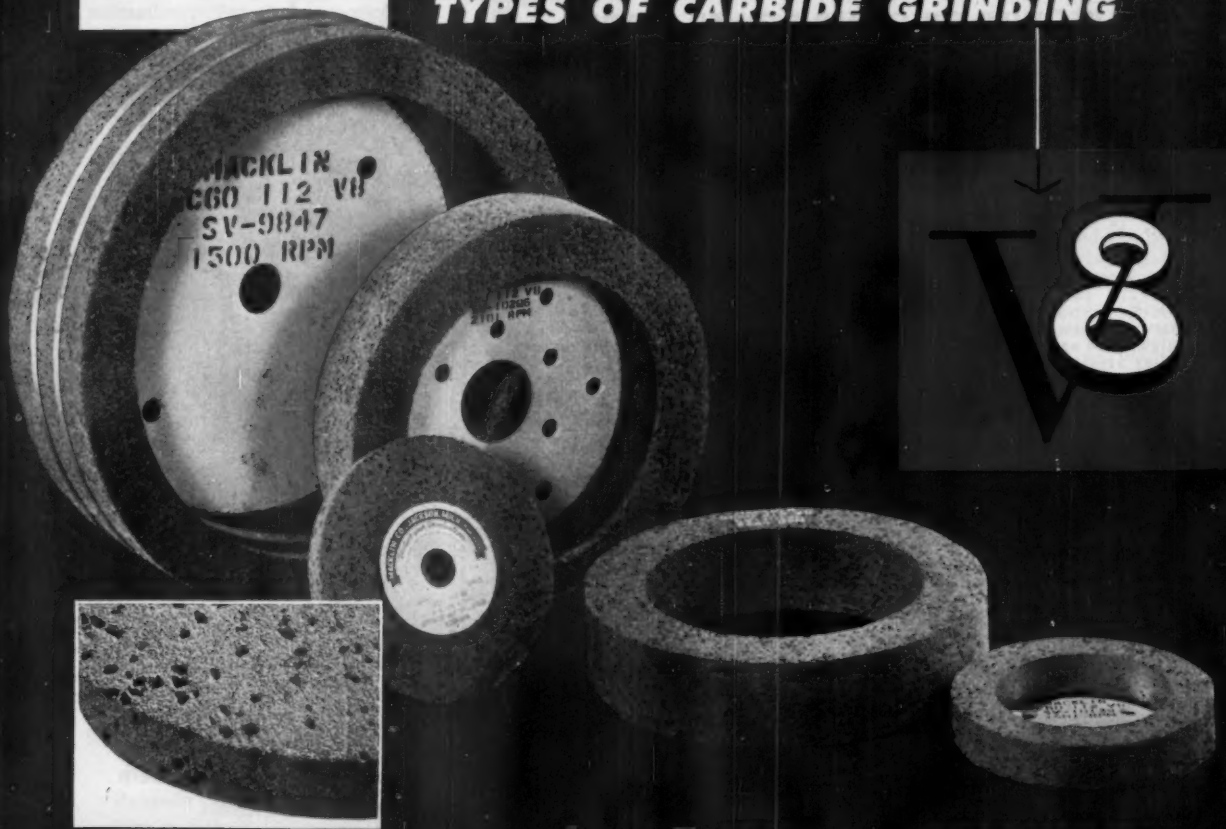
New Temperature Regulator Protects Products in Process

No. 997 closes automatically to prevent overheating in case the thermostatic unit is accidentally damaged. Large 4⅝-in. bellows assures powerful response in controlling flow of steam, hot water, or other medium. Special tight-closing, single-seated

NEW

MACKLIN

INCREASES PRODUCTION ON ALL TYPES OF CARBIDE GRINDING



V8

CONTROLLED POROSITY
Note the open pore structure on this close up of a Macklin V-8 Wheel.

The new Macklin V-8 Wheel sets new standards of grinding performance. OPERATORS LIKE IT because of its soft, smooth "feel". It's easy on the wrists, easy on the tools, *cuts faster with less push.*

MANAGEMENT LIKES the long wheel life of the V-8 wheel, the way it increases production and cuts operator fatigue.

V8 *CUTS FASTER WITH LESS PUSH*

V8 *EASIER ON TOOLS*

V8 *EASIER ON OPERATOR*

V8 *HAS A SOFT, SMOOTH "FEEL"*

TEST V8 ON YOUR OWN JOB

It's a fact. Test the new V-8 Wheel on any one of your carbide grinding jobs and you'll switch! You get faster, cooler cutting . . . longer wheel life. But don't take our word for it. Test the V-8 Wheel *in your own plant . . . on your own job*

FOR A DEMONSTRATION WITHOUT OBLIGATION, CONTACT YOUR NEAREST MACKLIN DISTRIBUTOR OR CALL FOR THE SERVICES OF A MACKLIN FIELD ENGINEER.

THE NEWEST IN MACKLIN'S "WHEELS OF PROFIT" FOR INDUSTRY

MACKLIN company DEPT. 70 JACKSON, MICHIGAN

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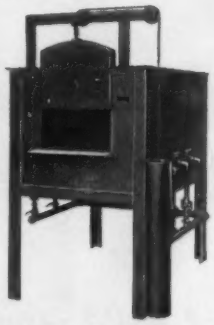
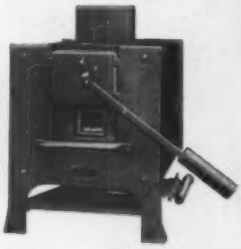
REG. U.S. PAT. OFF.
INDUSTRIAL GAS EQUIPMENT
BURNERS & FURNACES (Heat Treating, Melting, Soldering)

NO BLOWER OR OTHER POWER NEEDED
. . . just connect to gas supply!

Outstanding service since 1911! Each unit, with the famous "BUZZER" Venturi, delivers the hottest, quickest heat attainable without a blower. Full range control of heat and turn-down. Standards or specials available for manufactured, natural or liquefied gas applications.



HIGH SPEED FULL MUFFLE FURNACES, Bench Type for heat treating high speed and alloy steels — temperatures to 2400° F.



LARGE FLOOR TYPE OVEN FURNACES for universal heat treating of larger pieces — temperatures to 2000° F.

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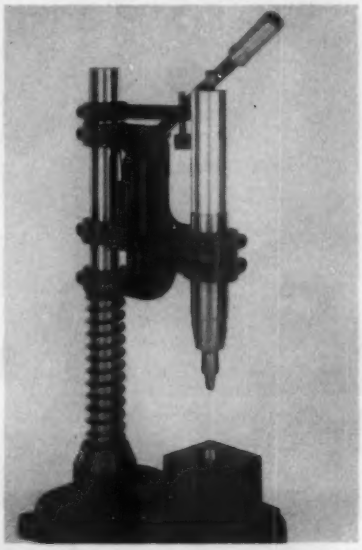
Kalamazoo, Mich.

valve makes it suitable for terminal service. Equipped with reverse-acting valves, units are adaptable for flow control of cooling water to transformers, internal combustion engines, air compressors, and degreasers. Sizes are from ¼ to 2 in.

Robertshaw-Fulton Controls Co, Fulton Sylphon Div, Box 400, Knoxville, Tenn



Airflex Bench Riveter Sets Both Hollow and Solid Rivets

Airflex bench riveter, SPB, has 7-in. throat, and is available in three capacity sizes for solid or hollow rivets 1/32 through ¼ in., based on solid mild steel.

Operation of the spinning (500 rpm) and impacting (to 16,000 bpm) tool is powered by air (30 to 80 psi) and riveting head is fed manually by hand lever. Unit is 11 x 13 in. x 27 in. high. Prices start at $432, which includes anvil, rivet rest and peen, and spanner wrench.

Lemert Engineering Co, Inc, 201 E Jefferson St, Plymouth, Ind

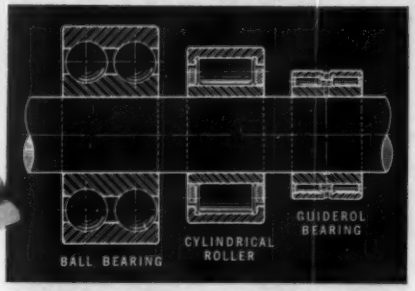
Motor field coil features insulating system that protects motor against atmospheric contaminants and destructive mechanical forces. Insulation consists of specially-oriented glass fibers augmented by heat-stable resins. Available for synchronous and dc machines in Class A and B temperature classifications.

Allis-Chalmers Mfg Co, 999 S 70th St, Milwaukee, Wis

BEARING TIPS by McGill

To pack more performance in smaller space

Use space-saving McGILL GUIDEROL® needle bearings

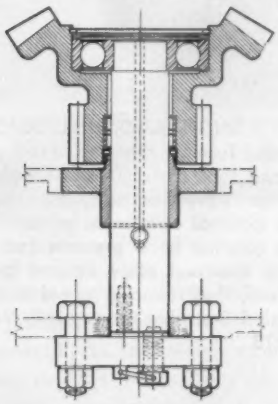


Showing graphically how a McGill GUIDEROL precision needle bearing permits more streamlined designing by supporting comparative loads in significantly smaller radial space than other types of bearings. Bulky and more costly housing space is easily avoided.

The McGill GUIDEROL Bearing combines the inherent high-load capacity of a full complement of full race width rollers with a center roller guiding principle that limits skewing and binding under misalignment. This qualifies the bearing for a whole range of applications that are too heavily loaded for a retainer-type bearing and are subject to the misalignment that precludes use of an ordinary needle bearing. For outstanding performance in small radial space, use GUIDEROL precision needle bearings. Specify the interchangeable sealed SGR series for added protection against contamination.

GUIDEROL® *bearing capacity, space economy proved in power shovel vertical reversing shaft assembly*

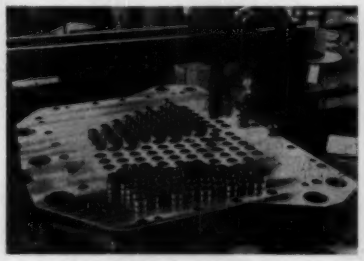
Baldwin - Lima - Hamilton Corp. uses a McGill GUIDEROL bearing, on ½ cubic yard power



shovels, to carry spur pinion loads in the vertical reversing shaft. The high capacity of the bearing in small radial space is an important factor in selection of this bearing. Only 3.75″ in diameter, it has a load capacity of 28,560 lbs. at 100 rpm. In the power shovel application, it supports 14,150 lbs. at 76.3 rpm, which gives a high margin of safety. The center guided rollers also are especially adaptable to a vertical application such as this.

Fact-packed Bearing Catalog

Write for your copy of Catalog #52-A, a 128 page Bearing Selection Guide. It contains vital product information and 30 pages of engineering data.



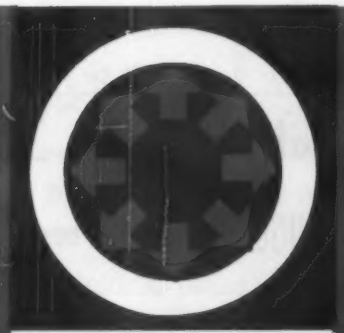
Multiple spindle drill heads require support of spindles on very close centers

Crowding a great number of drill spindles into a small area, Zagar, Inc., of Cleveland has found the McGill GUIDEROL bearing construction especially suited to the needs of multiple drill head units. The full bearing width rollers provide rigidity and more than adequate load capacity and in a bearing only 1.25″ in bore diameter.

Insure performance with McGILL®

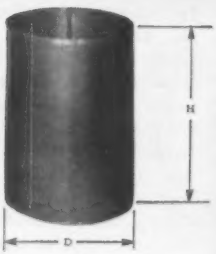
MULTIROL® GUIDEROL® CAMROL
Precision Needle Bearings

McGILL MANUFACTURING COMPANY, INC., 300 N. LAFAYETTE ST., VALPARAISO, INDIANA

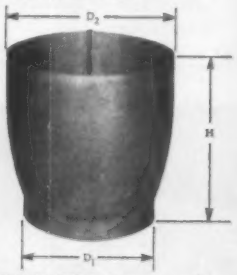


GROTNES EXPANSION FORMING SHAPED THIS PART—

how would YOU do it?



BEFORE EXPANDING—Deep Drawing Quality Steel 0.035" Thick is Coiled and Lap-Seam Welded to form the 9¼" I.D., 12¾" High Cylinder Blank.



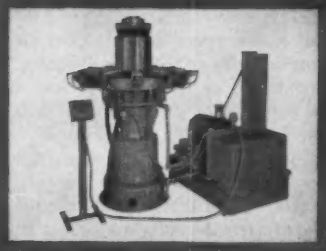
FIRST EXPANSION—Opens one end to 12½" dia.; Expands the other end to 10" dia.; reduces height to 11⅛"

SECOND EXPANSION—Forms the bead; opens the large end to 15" dia.; leaves the small end at 10" dia.; reduces height to 11⅛"; reduces metal thickness to .031" at the large end.

After trimming the protrusion at the weld, the part is ready for subsequent operations. Success in expansion forming this part, as well as any other, depends on metal ductility and weld strength.

Expansion forming and sizing the connector illustrated results in smaller tooling investment, lower material cost, less scrap, fewer operations, higher production.

GROTNES MACHINE WORKS makes a complete line of mechanical and hydraulic expanders to form and size metal parts having a continuous cross-section (circular, oval, square, polygonal). Tolerances can be held within plus or minus 0.002" on a diameter. Grotnes expansion forming makes difficult jobs easier. Cut your production costs by the Grotnes expansion forming method. Write today.



16-H-320 Horizontal table hydraulic expander typical of the Grotnes line of Hydraulic Expanding Machines.

Free Fact Book—Mail coupon below for illustrated story of the unique GROTNES method

Expanding Roll Forming Shrinking

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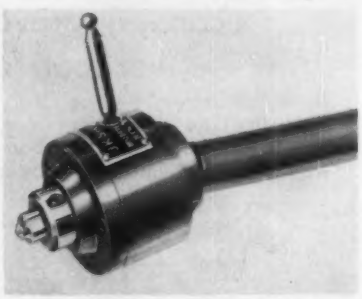
NEW SHOP EQUIPMENT

AIR-MOTOR LUBRICANT PUMP, incorporating a steel cover, can be clamped in 30 sec to any standard 25- to 50-lb refinery container. Maker reports pump will develop grease pressure 50 times greater than air-line pressure. Pump dispenses all pressure-gun lubricants in any weather, includes follower plate for positive prime. Bulletin 727—*Lincoln Engineering Co, 5703-27 Natural Bridge Ave, St Louis 20, Mo*



ROTATING DIAMOND TOOLHOLDER, called Turnit, is reported to reduce diamond tool costs 50%. Available for either manual or automatic operation on external or internal grinders, Turnit's rotating head presents continuous new diamond edge against grinding wheel, thus reducing wheel wear—*J K Smit & Sons, Inc, Murray Hill, NJ* 0213

Metallizing powder, Colmonoy C-250, is high chromium-nickel powder containing chromium borides. It has a low coefficient of friction, controlled surface porosity and good oil retention properties, and is recommended for rebuilding engine and compressor crankshafts.

Wall Colmonoy Corp, 19345 John R St, Detroit 3, Mich

MORE HOLDING POWER

than any other PERMANENT MAGNET CHUCK!

Make your own tests! Just fill out the coupon below and we'll be glad to demonstrate the new Brown & Sharpe permanent magnet chucks in your plant. You'll have a chance to compare the increased holding power... see actual samples of work done on grinding and milling machines using this strongest permanent magnet chuck on the market!

NEW BROWN & SHARPE Rectangular Model Permanent Magnet Chucks

Greater Holding Power — Greater holding power than *any* other permanent magnet chuck... greater holding power for most jobs, in fact, than electromagnetic chucks with standard pole spacing.

Lower Height — Provides additional vertical clearance.

Larger Magnetic Area — Lets you put more work on the chuck... holds it tightly over the full magnetic surface.

New L-Type Back Rail — Makes it easier to true work-locating edge in position... eliminates the need for spacing members between rail and work.

Lighter Weight — Lightened 25% for easy handling.

Longer Lever — Provides leverage for easy operation.

Two Sizes — 5" x 10" x 2" and 6" x 18" x 2½".

The new Rectangular Model Chucks also have all the advantages of other Brown & Sharpe Permanent Magnet Chucks. They require no electrical connections, wires, switches, or auxiliary generators. There's no heating — no operating cost. A simple turn of the lever holds or releases the work.

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Brown & Sharpe

MILLING, GRINDING AND SCREW MACHINES, CUTTERS,
MACHINE TOOL ACCESSORIES, PRECISION TOOLS, PUMPS

Brown & Sharpe Mfg. Co.
Providence, R. I.

Gentlemen:
Please send me more information about your new Permanent Magnet Chuck ☐
I would like to see a free demonstration ☐

NAME _____ TITLE _____
COMPANY _____
STREET _____
CITY _____ STATE _____

K. R. WILSON PRESS HELPS HARNESS ATOMIC ENERGY

No. 3700AA-200-2

DRAMATIC EXAMPLE OF PRESS PROGRESS BY WILSON

Zirconium! . . . in this single word lies a story of remarkable press progress at K. R. Wilson. A press was needed for cutting and pressing zirconium, glistening metal vitally important in the construction of nuclear reactors for atomic energy. The problem was put to Wilson engineers. *The challenge was accepted and a press was built to do the job!* The K. R. Wilson 3700AA-200-2 200-Ton Capacity Motor Driven Hydraulic Press combines all the features necessary to cut and press zirconium with maximum efficiency and economy. The 3700AA-200-2 is but one of scores of examples of the years-ahead technical thinking that makes any type of Wilson press your wisest buy.

CONSIDER THE FEATURES AND YOU'LL CHOOSE WILSON
MODEL No. 3700AA-200-2

HEAVY DUTY RAM 6" diameter heat treated and ground alloy steel ram. 10" bore. 18" stroke.

DOUBLE ACTING CYLINDER Provides power on upstroke for stripping and to offset weight of tooling.

COMPLETE RAM CONTROL Stops in any position; allows you to raise just enough to clear work.

GUIDED RAM Non-rotating ram completely eliminates ram turning.

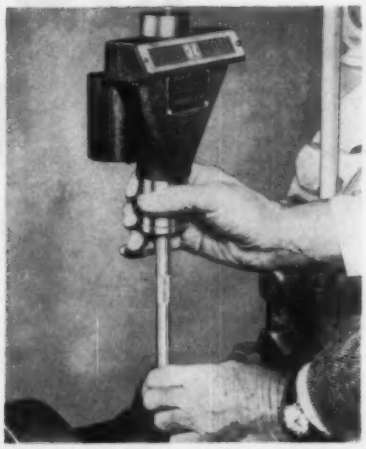
SIDE-MOUNTED HYDRAULIC UNIT Requires minimum amount of floor space; easily accessible for service.

RAM SPEEDS Rapid Idle Approach Speed to 23 tons, 52" per minute. Pressing Speed to 200 Tons, 8¾" per minute. Rapid Idle Return to 15 Tons, 75" per minute.

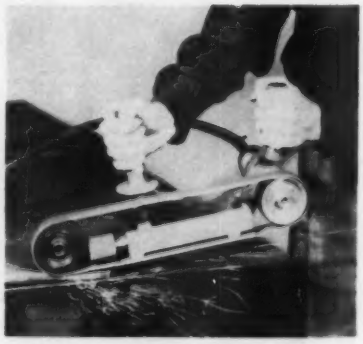
FOR FULL DETAILS WRITE FOR BULLETIN No. 37

HYDRAULICS DIVISION
K. R. WILSON, Inc.
OFFICES AND FACTORIES — 210 MAIN ST., ARCADE, NEW YORK, U.S.A.

NEW SHOP EQUIPMENT



DAVEY VIBROMETER, Model-P, has scale positioned to give equal visibility for vertical and horizontal readings. Instrument measures vibration amplitude on machine structures, and by means of integral probe can make measurements directly on rotating shafts. Amplitude appears on scale as reflected band of light. Available in magnifications of 125:1, 250:1 and 500:1—*Vibroscope Co, P O Box 97, Glenford, NY*



ABRASIVE BELT UNIT, G&P 3-36, weighs 6¾ lb, permits grinding on contact wheel, on the platen or slack of belt for convex surfaces. Air-motor operated tool develops speed of 4700 sfpm—*Grinding & Polishing Machinery Corp., 2530 Winthrop Ave., Indianapolis 5, Ind*

Magnetic tool rack called Magna-Bar provides full-view storage for all hand tools. Unit features lifetime magnets, holds tools securely, and is easily attached to wall or shelf. 24-in. craftsman size, complete with mounting brackets, costs $9.95.

Magnetrode Corp, 1615 Main St, Kansas City 8, Mo

courtesy Linden Tool and Manufacturing Co.

Linden's Gilbert holds 235 holes on location ±.0007″

This is the kind of job you can handle profitably if you have a good operator and a Cincinnati Gilbert horizontal boring mill.

The piece is a 50″ by 120″ base for special indexing. Linden Tool and Manufacturing Co., Dayton, O., performs these operations:

1. Mill keyways 9/32″ deep, full length and width of the base. Width of each keyway is 1.000″ ± .001″.

2. Drill 235 indexing holes, .625″ diameter. These holes must be held on location within ± .0007″. In addition, center lines of the holes (horizontal and vertical) must be parallel and square with the key-ways within .001″.

This job is another demonstration of the exceptional rigidity of Gilbert boring mills. Extended table and saddle supports help to maintain accuracy and handle the workpiece. Linden Tool and Manufacturing Company uses two Gilberts to produce a broad range of quality work for its Dayton area customers.

Gilbert boring mills are built as both Table and Floor types, with spindle diameters of 3½″, 3¾″, 4″, and 5″. A selection of column heights, bed lengths, table sizes, and workholding units makes them easily adaptable to your requirements. Add to your work capacity—and your machining dollars—by getting a proposal from Gilbert now.

The Cincinnati Gilbert Machine Tool Co.
3340 *Beekman Street, Cincinnati 23, Ohio*

Low-cost financing plan—6% simple interest (3% add on), up to 5 years to pay—makes your purchase of Gilbert equipment immediately feasible. Subject to change.

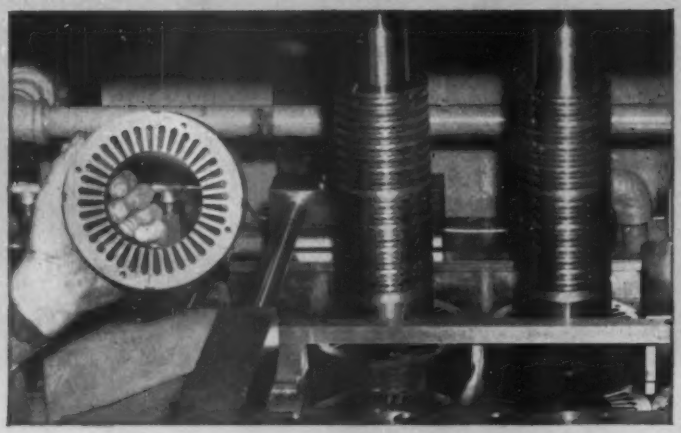
those who buy Gilbert buy **GILBERT** *again*

This situation called for a

SHELL BROACH

. . . another one of those good

LAPOINTE - BROACHES



Large round holes in laminated stator cores were to be broached. Because Lapointe engineers knew about the excess wear-factor that requires consideration when cutting laminated material, it was decided that a shell type broach would be the most practical.

As a result of using this design, a stack of stator cores 2½-inches high can be broached in one pass, with maximum efficiency and economy.

Lapointe designs and builds every type of surface and internal broach, ranging all the way from the simple keyway broach to broaches with extremely complicated forms and minimum tolerances. You should take advantage of the engineering, hardening and grinding "know-how" that goes into Lapointe-built Broaches.

Good broaches cost you less in the long run!

LAPOINTE-BROACHES, *Electrolized* increase broach life between grinds from 2 to 10 times.

Write for BOOKLET No. 2
"How to care for BROACHING TOOLS"

THE LAPOINTE MACHINE TOOL CO.
HUDSON, MASSACHUSETTS — U. S. A.
In England, Watford, Hertfordshire
THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

LAPOINTE
known to be the best in
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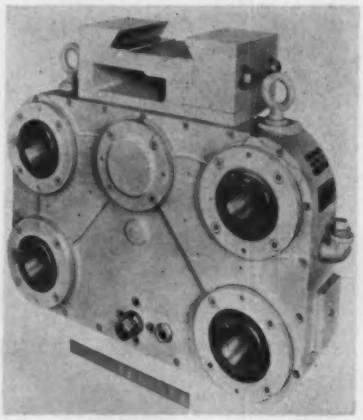
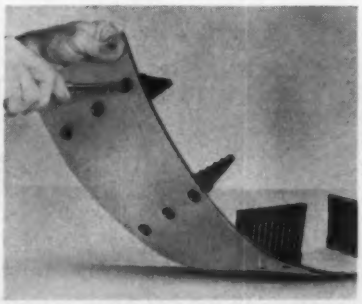
NEW SHOP EQUIPMENT



FIXED-CENTER MILLING HEAD mounts on over-arm of milling machine and is supported against machine column. Short-type spindles eliminate overhang and provide more rigid tool mounting. Features include: full ball-bearing construction; heat-treated, Chrome-Moly steel helical gears. Circulating oil pump feeds all bearings and gears—*Thriftmaster Products Corp, 1016A N Plum St, Lancaster, Penna*



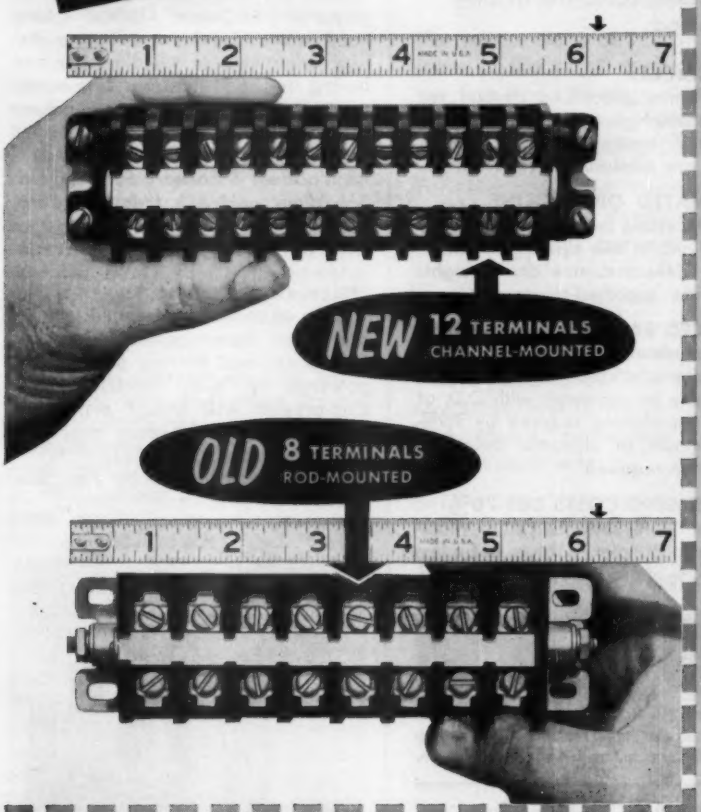
SCREW-ON CLEAT, called Tatch-A-Cleat, is made of molded neoprene and may be screwed onto any conveyor or elevator belt. Threaded metal inserts are molded in base of cleat; screws and countersunk washers, which engage the inserts, concave the belt preventing metal contact with pulley. Cleats are available in heights from ⅝ to 3 in.; in widths from 1½ to 24 in.—*T H Hinchcliffe, 1450 La Loma Rd, Pasadena 2, Calif*

Indicators and controllers for use with resistance thermometers are available in full line of single and multi-point models. Variety of standard and double scale ranges (from −100 to 500 F) are offered with reported accuracy to ½% of range.
West Instrument Corp, 4363 W Montrose Ave, Chicago 41, Ill

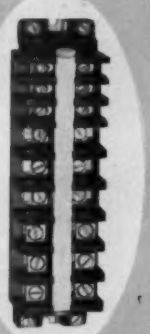
50% MORE TERMINALS IN THE SAME SPACE!

SQUARE D's *NEW* TERMINAL BLOCKS

MORE FLEXIBILITY, TOO!



NOTICE *(above)* how little space is required to remove or add a Square D channel-mounted terminal block to the completely assembled unit. Especially important for a quick change when an additional terminal must be inserted into grouping.



LOOK *(at right)*... all sizes can be mounted on same channel...25 ampere pressure wire connectors, 25 to 50 ampere box lugs ...all can be interlocked together. Terminals in kit form to "do-it-yourself" or factory-assembled to standard specifications.

SEE *(below)*...there is only one perforated channel required for either weld or screw-on mounting...available in standard lengths that can be cut "on the job" to fit any length requirement. Eliminates stocking various sizes.

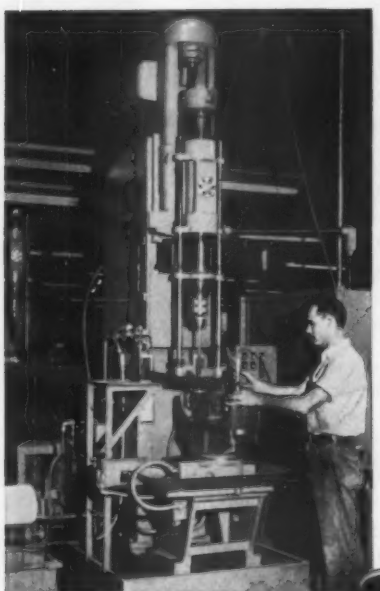
ASK YOUR SQUARE D FIELD ENGINEER
or write for Bulletin which covers details on Channel-Mounted Terminal Blocks. Address Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin.

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE

SQUARE D COMPANY

WHY Emerson Electric MICROHONES Laminated Steel Rotors

The Emerson Electric Manufacturing Company is constantly searching for the best possible processing methods. Working with Micromatic engineers on problems encountered in processing shaft holes in their laminated steel rotors, Emerson Electric found that Microhoning would provide much higher production quality while lowering processing costs. The following Microhoning benefits are now obtained:



Model 728 Hydrohoner with automatic Microsize, Microdial and two station rotary indexing fixture. Hole Tolerances: Diameter .0002 inch, straightness and roundness .0001 inch.

CUT REJECTS
With former processing method rejects ran too high. Microhoning controls size and assures a clean hole—rejects are substantially reduced.

ELIMINATED OPERATIONS
Old processing method required two operations. In one operation, Microhoning generates size and straightness within specified tolerances.

REDUCED BALANCING TIME 70%
To preclude vibration and poor operating characteristics, it is essential that shaft hole be concentric with O.D. of rotor. Microhoning reduced by 70% the amount of dynamic balancing correction required.

PROCESSING COSTS CUT 70%
Current figures show the cost of Microhoning shaft holes in rotors to be less than 30% of processing by old method.

Rotors (from 2¼ to 4 inches long) are all Microhoned on the same machine by changing adaptor in fixture and resetting stroke length.

Learn why Microhoning will give you efficient stock removal, closer tolerances, accurate alignment and functional surfaces.

☐ Please have a Micromatic Field Engineer call.
☐ Please send Micromatic literature and case histories.

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MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE · DETROIT 38, MICHIGAN

PROJECTION SCREENS, part of an optical coordinate setting system incorporated in Kearns' Optimetric boring machine (British), are fitted to vertical adjustment of spindle shaft and boring stay, and the transverse movement of the table. Settings within an error of no more than 0.00025 in. are said to be possible—*Imported by British Machines & Foundry Supplies, Ltd, Subsidiary of British Industries Corp, Port Washington, NY*

Midget air compressor, known as 303, weighs 45 lb and is designed to handle small spray painting jobs. It has no exposed moving parts and is powered by ½-hp electric motor. Compressor will accept company's Eclipse Jr-46 or G-6 spray guns with special nozzles. Price: $98.
Eclipse Air Brush Co, 390 Park Ave, Newark, NJ

LIFTING AND CLAMPING ATTACHMENT for lift truck permits truck to double as standard fork truck and as clamp truck. Unit has clamping capacity of 27 to 75 in. in width; with upper arms out of way pallets can be lifted to height of 75 in. Entire unit is rotatable through 360 deg, and can handle loads up to 3200 lb at 24-in. load center when mounted on 5000-lb capacity truck—*Yale & Towne Mfg Co, 11,000 Roosevelt Blvd, Philadelphia 15, Penna*

SPRAY BOOTH, No. 2019, is small, self-contained unit that occupies floor space of 24 x 28 in. and is 60 in. high. Constructed of steel panels, unit is equipped with enclosed 10-in. fan exhaust with self-closing butterfly damper. A glass-wool filter unit catches spray mist and residue. An air filter and regulator is offered as an accessory, permitting control of air pressure on the booth and providing a condensation chamber for removing water from the air line—*Craftools, Inc, 401 Broadway, New York 13, NY*

Liquid rust remover de-rusts tools, dies, jigs, wire and other ferrous metal products where a bright finish is not needed. Chemical action dissolves rust film, but stops when iron or steel surface is reached. Treatment reportedly protects from re-rusting. Material is non-toxic, harmless to rubber and paint, and has no flash point.

Harlan Products, Inc, P O Box 66, Cheltenham, Penna

Rust preventive oil, designated Froil, reportedly offers three-way protection: moisture and vapor-proof barrier against corrosion, water displacing properties and fingerprint removal. Recommended for protecting precision parts, dies and tools, oil comes in 54-gal and 5-gal drums and in gal and pint case lots.

Octagon Process, Inc, 20 Bank St, Staten Island 1, NY

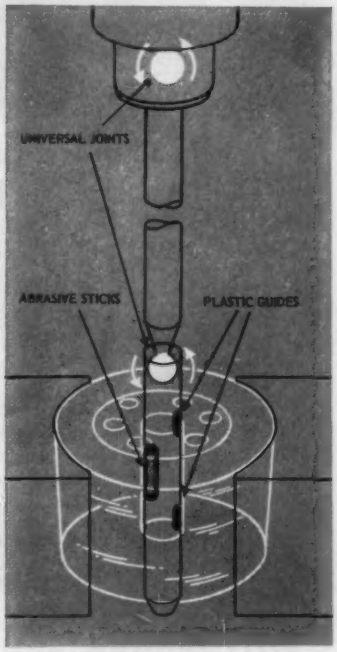
Layout compass has vernier for reading to 0.001 in. Compass is beam type with scale acting as beam. Removable phonograph needles are used as points in compass and in companion scriber. Both tools come in wooden case with extra points. Scales available in 6 or 12-in. size.

Titan Tool and Supply Co, Inc, Dept B, 1419 Hertel Ave, Buffalo, NY

HOW MICROHONING Laminated Rotors Cuts Processing Costs

Emerson Electric squirrel-cage rotors are made of special "electrical grade" steel laminations and each lamination is coated with oxide insulation. In processing the rotor, the O.D. is turned concentric with the shaft hole. Then, in one operation, Microhoning accurately generates finished size and straightness of shaft hole without any change in hole location.

The Micromold tool has two universal joints in the drive shaft which allow the tool body to align itself with the shaft hole. Microhoning of holes is along same axis from which O.D. was turned.



For electrical and mechanical efficiency, assembled motors must have a uniform air-gap between rotor and stator of .006 inch to .011 inch. Because laminated surface is rough and close tolerances must be held, special guided Micromold tools are used. Plastic guides above and below abrasive sticks, control dressing of abrasive and assure generation of round, straight shaft holes.

Before installing Microhoning equipment, two operations were required to finish shaft hole—rejects ran high. Microhoning greatly reduced the amount of dynamic balancing correction required.

The principles and applications of Microhoning are explained in a 30-minute, 16 mm, sound movie, "Progress in Precision" . . . available at your request.

☐ Please send me "Progress in Precision" in time for showing on_____(date).
☐ Please have a Micromatic Field Engineer call.
☐ Please send Microhoning literature and case histories.

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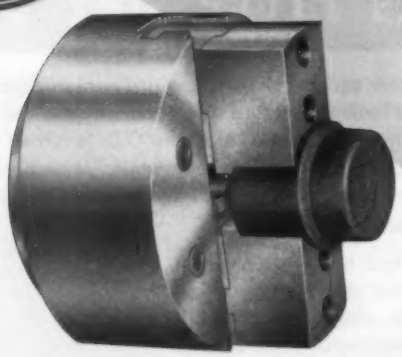
MICROMATIC HONE CORP.
8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

POWER CHUCKS



for more gripping power– higher production

Famous S-P cam and lever design holds the work tighter, permits cost cutting heavy feeds and multiple cuts. S-P cam and lever design also resists opening of jaws by centrifugal force or diminishing air pressure . . . an important safety factor. Balanced for high rpm.

S-P SELF-CENTERING CHUCKS are built in Universal American Standard models, sizes 6" — 8" — 10" — 12", and Serrated models in 8" — 10" — 12" sizes. Two or three jaws.

S-P COMPENSATING CHUCKS grip out-of-round work with equal pressure on each jaw. Available in 8" — 10" — 12" sizes, two and three jaw models, American Standard or Serrated.

S-P ROTATING CYLINDERS

Air and Hydraulic

Adequate stroke for long jaw travel of S-P Chucks. Balanced for high rpm on machine tools and other applications. Details in Catalog No. 105 (Air) and Bul. 201 (Hydraulic).

S-P Power Chucks are installed as original equipment by Bardons & Oliver, Cleveland Automatic, Cone Automatic, Ex-Cell-O, Jones & Lamson, Monarch, Warner & Swasey . . . and many others. Representatives in principal cities. Prompt deliveries. Send for catalog No. 105. The S-P Manufacturing Corporation, 30201 Aurora Rd., Solon, Ohio.

Specify SP

THE S-P MANUFACTURING CORP.
SOLON, OHIO • *IN GREATER CLEVELAND*
ESTABLISHED 1916 — A BASSETT COMPANY

NON-ROTATING AIR AND HYDRAULIC CYLINDERS • ROTATING AIR AND HYDRAULIC CYLINDERS
POWER CHUCKS • COLLET AND DRILL PRESS CHUCKS • AIR PISTONS, VALVES, ACCESSORIES

ROUND TABLE *Discussion*

DEVELOPMENT CORNER

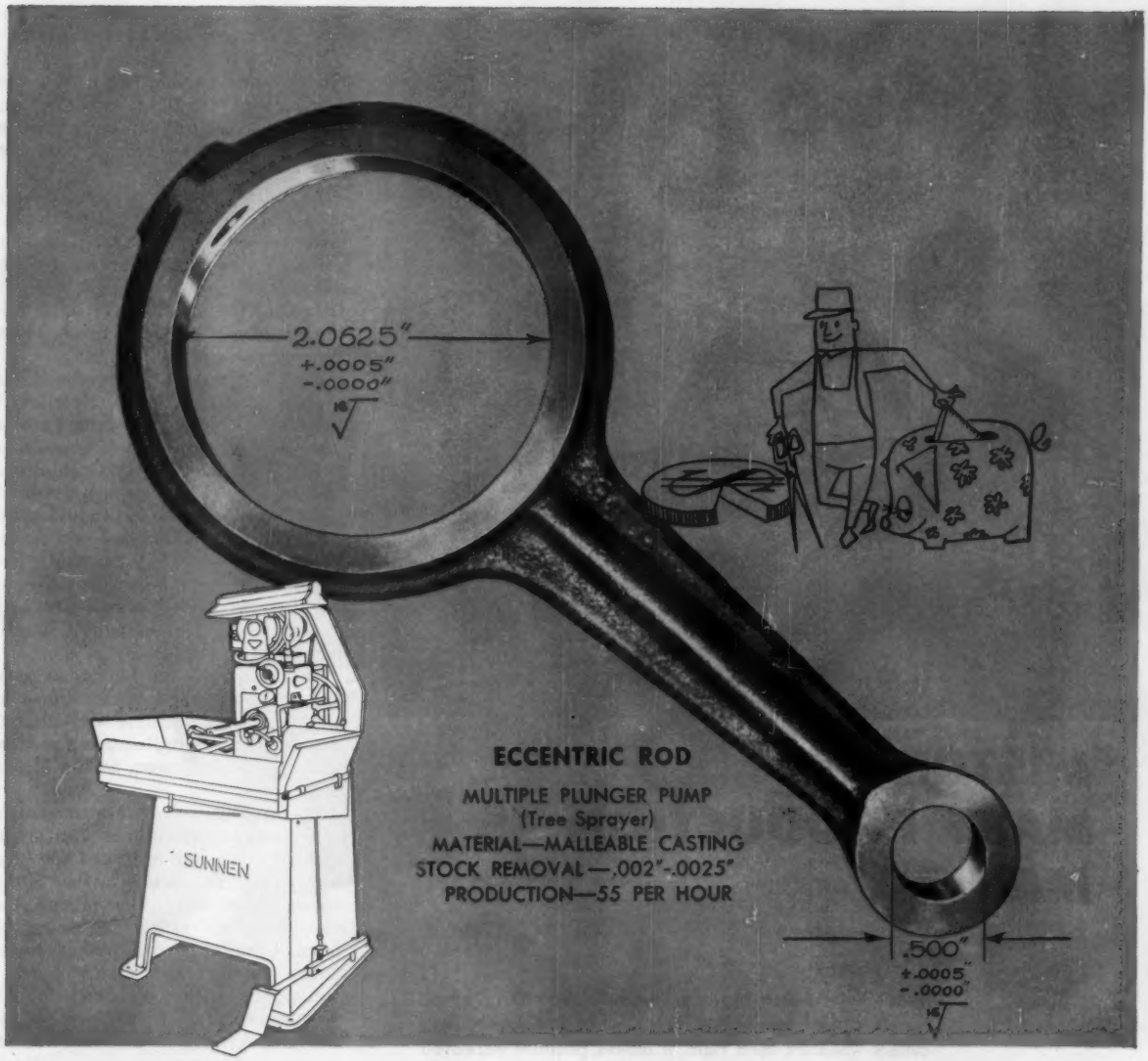
If a shop wants to experiment in development work, how should it be handled? Should an independent department be set up? Is it fair to take a man away from a foreman to work on development, without replacing him?

IT CERTAINLY WOULD APPEAR that Ed had lost complete control over Hanson. This is a serious thing, for when a foreman loses the power to direct his men, then he can no longer be useful to the company.

In this case, no doubt Harrison and top management decided to establish a special department but also, like many of those in top management, are unwilling to really take the bull by the horns and do the job right. They think that they are smarter than the other fellow who has tried this idea only to end up in disaster —a disaster which finds the only solution in a new foreman and, many times, expensive loss of production and productive labor.

Each time a new idea is tried by a company in the establishment of a new department or the creating of new jobs in an old department a company policy should be well worked out in advance. This means the integration of such an idea into the present system. Certainly the president would not think of establishing a department made up of his

"Watch how they dive into my mulligan stew."



A COST-CUTTING PROCESS FOR ACCURATE BORE PRODUCTION

Tolerances are getting closer and closer! That's why producing bores to specifications (size and finish) with standard machine tools is becoming a tough job.

Many plants—large and small—have found the answer is Sunnen-Sizing. Holes are produced slightly undersize on the preceding operation... then, Sunnen Honing is used as the standard bore-finishing operation.

This process speeds production because you can open up tolerances on reaming, boring or grinding. You can increase speeds and feeds. Your tools last longer. Less time is lost sharpening, dressing and resetting tools.

Overall production is increased, all parts come within specifications... no undersize rejects—no oversize scrap.

GET ALL THE FACTS ON SUNNEN HONING

SUNNEN® PRODUCTS COMPANY
HONING

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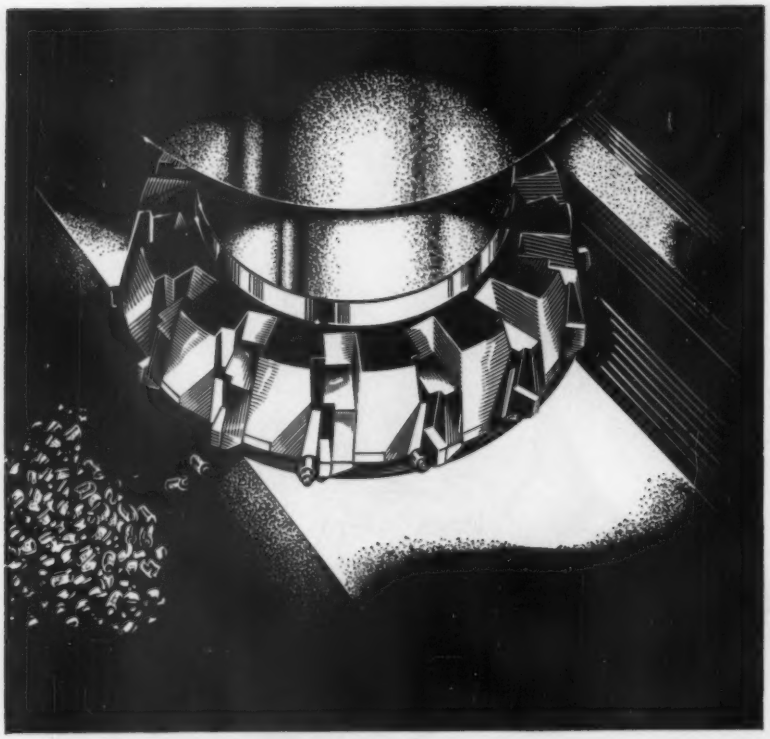


"MISTREATED MASS PRODUCTION MANIAC"

That's the inserted blade carbide tipped milling cutter. Here's a tool that really outperforms ordinary milling cutters when it's used right. It makes possible increased production with more pieces per grind and better finishes at lower cost.

Economical milling with carbides requires careful tool engineering. This has been recognized for many years at Go & Go. Failure to do so has soured many a carbide application.

Go & Go produces a complete line of inserted blade carbide milling cutters including tools designed for specific jobs (specials). We think they're the finest you can buy because sound engineering comes with these cutters. If your application isn't right for them, we'll tell you so. And we'll tell you how to make it right.

For specifications on a really complete line of inserted blade carbide milling cutters, ask for Catalog "F". Or better still, consult the Go & Go engineering sales representative in your area.

Go & Go

GODDARD & GODDARD COMPANY
DETROIT 23, MICHIGAN
Engineering and producing tools that Go & Go since 1917.

top executive people that did not answer directly to him but to the chairman of the board. Sounds silly? It is, but no more so than what happens when a man is taken from a foreman and is still supposed to be under the foreman but report only to someone else.

Naturally the man, Hanson, begins to feel his oats. Actually, he is working without any supervision, for while his end product is seen by all, he goes on without any control, for Harrison, the super, pays no attention to him since he, Hanson, is on the foreman's payroll.

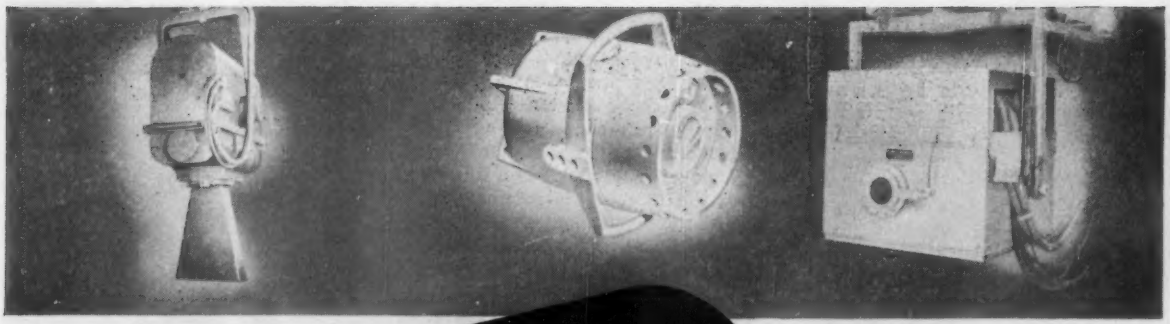
Thus it goes, no clear-cut role for the development corner. Now let us say that a development program is a vital thing under today's conditions in business. No company can afford to be without two things—a development staff and a new product staff. Often these functions are combined. Thus new products are constantly being scanned for the company for diversification, and also new products developed for the company's line of merchandise.

This is a full-time job for at least one employee and many times it grows into a sizeable department with its own manufacturing section which is often known as the Model Shop.

It is regrettable when a company's supervisory staff is not farsighted enough to see the need and see how best to handle such growth. Many times we should not condemn the supervisor but rather the executive team at the top for short-sightedness. Often they are the ones who want something without paying for it. "Pennywise and pound foolish" is the old saying, and it too often causes a company to degrade itself to a point where it takes many more thousands to correct the condition than if a properly integrated plan had been studied and followed at the outset.

Now don't think, foremen, that be-

"Somebody in there send for a clean-up man?"

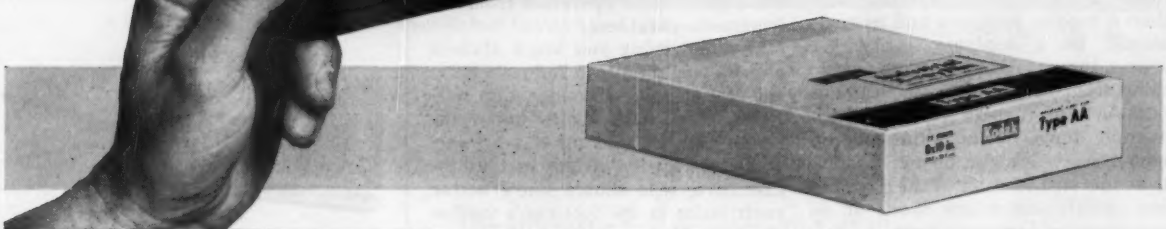


New Kodak X-ray Film

for

shorter exposures and quicker examinations

Kodak Industrial X-ray Film, Type AA



Read what the new Kodak Industrial X-ray Film, Type AA, will do for you.

- Reduces exposure time—speeds up routine examinations.
- Provides increased radiographic sensitivity through higher densities with established exposure and processing technics.
- Gives greater subject contrast, more detail and easier readability when established exposure times are used with reduced kilovoltage.
- Shortens processing cycle with existing exposure technics.
- Reduces the possibility of pressure desensitization under shop conditions of use.

Here is a brand-new x-ray film that gives you greatly increased film speeds. It is a film that retains the fine sensitivity characteristics which have made Kodak Type A the most widely used x-ray film in industry. Then in addition it gives speeds up to more than double those of Type A.

This means that you can cut down exposure time, handle routine examinations more quickly.

Your x-ray dealer and the Kodak Technical Representative are ready to tell you all about this new film. Get in touch with them. See what it will mean to you.

EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, N. Y.

Kodak

cause you have a problem similar to Ed's that you can sit back and do nothing. You must see that your supervisor knows all the facts. Don't just talk, back it up with facts. Know your job and see that you do it. You are responsible for all men under you who are assigned to your department. Don't argue, be firm and present facts. Ask to be heard at a higher level if you fail to win a point with your immediate supervisor.

To give up is the admission that you are not a good foreman. Should you lose all the way and nothing is done to correct the condition, then seriously consider your own position, what the company means to you, and where it is headed under its present management. Then act accordingly.

To the management of companies, we say don't play with your key personnel; respect their rights. Your desire to keep them as part of the management team and yet to ignore their suggestions forces them to establish and join unions. Do your part to keep your company harmonious throughout.

Charles D Townsend
West Hartford, Conn.

AN EXPERIMENTAL DEPARTMENT functions in an entirely different way than a regular toolroom and as such should be a separate entity. Of course, in a small shop, where everything from cooling soup to hexagon nuts—where regular work of production down to the fixing of the manager's wife's can opener is done in stride—is the order of the day, one can readily see where work of an experimental nature could be tolerated. However, in a well-regulated toolroom, to assign a particular person to such work as comes under the heading of experimental is bringing into effect a form of, shall we say, heterogenity not conducive to the effectiveness of an organization.

Any move of this kind is a direct slap in the face of the foreman in charge of the department and constitutes a flagrant disrespect of the basic law of productive psychology. In a sense, it is comparable to the effects which would ensue were a man to take another woman home and tell his wife that the newcomer was going to do some special work for him and that she should go about her own business and not to interfere. Can't you see the germinal possibilities of the wife concluding that something else will eventuate in time?

I don't know what kind of psychology seeps through Harrison's brain to impel him to take a man away from a foreman and place him in a position to needle mentally the one in charge. Instead of arguing with Harrison, Ed should have stood his ground and insisted that Hanson's removal from regular work be compensated by hiring another man to take his place in order to maintain production schedule. I should at least think that Harrison would have had the sense to remove the cost of the experimental operation from the foreman's shoulders.

The first thing you know Hanson will be confiding in a fellow worker and vauntingly announce his independence. This comes under the heading of the making of a big-shot and is decidedly wrong in that the executive, who should know better, contributes to the foreman's ineffectiveness. If a man works for me I want to be the one to assign him his work.

Al's suggestion that Ed switch somebody else to the development work to put Hanson back on his former job is, to my way of thinking, disregarding two very important things: (1) Hanson, after taking the attitude he did toward his foreman, would no longer be any good as a regular unless he transferred himself out through the gate and got another job. (2) It would be like killing two birds with one stone—ruining them both.

Harrison may be smarter than Ed gives him credit for. An extra department entails considerable expense other than the wages of the one man and it is no doubt with this thought in mind that he insists on

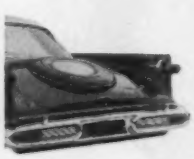
(Continued on page 220)

"Let's get the old man talking about the good old days . . . I need a rest . . .

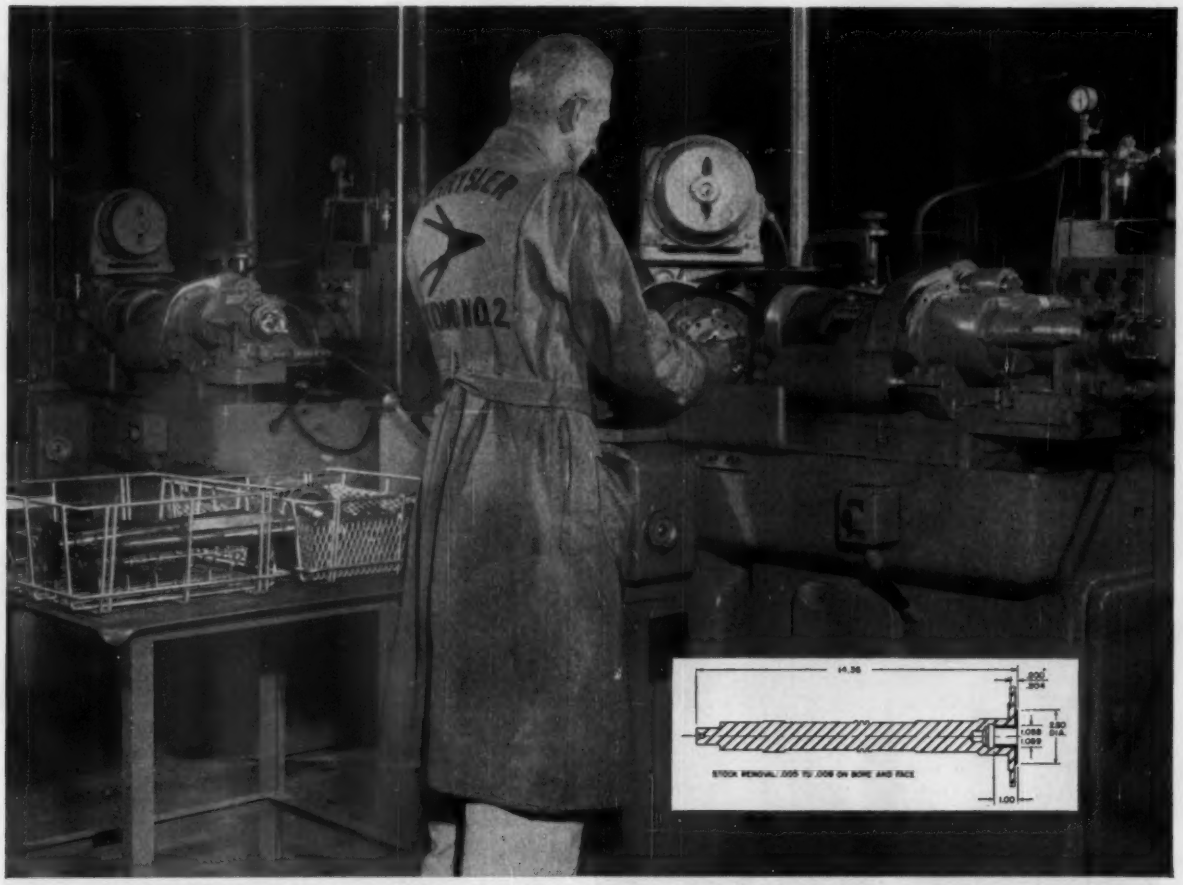
(Advertisement)

Meet WALTER AUGUSTEN

Bryant field engineer in the Indianapolis, Indiana area. For detailed information on how Bryant can help improve production in *your* plant, call Mr. AUGUSTEN at CLIFFORD 5-8809 in Indianapolis, Indiana, 2037 East 46th Street.



The 1957 Chrysler Imperial



A Bryant 2209-Y grinds transmission output shafts at Chrysler's new Kokomo, Indiana Torque Flite Automatic Transmission Plant.

Chrysler "guns" its production with BRYANT INTERNAL GRINDERS

The automatic transmissions in 1957 Chryslers – and in all other Chrysler-built cars – are designed for long-lasting, trouble-free operation. Making them so, and doing it profitably, calls for mass-producing the precision machined parts, such as transmission output shafts.

Bryant Internal Grinders speed up the production of these precision components in many ways. Combining operations – bore and face grinding simultaneously as illustrated – is one way.

As with fine cars, there's a Bryant Internal Grinder – manual, semi-automatic or automatic designed to suit your particular requirements.

Why not investigate how Bryant's engineering service can help you attain higher production at lower operating costs.

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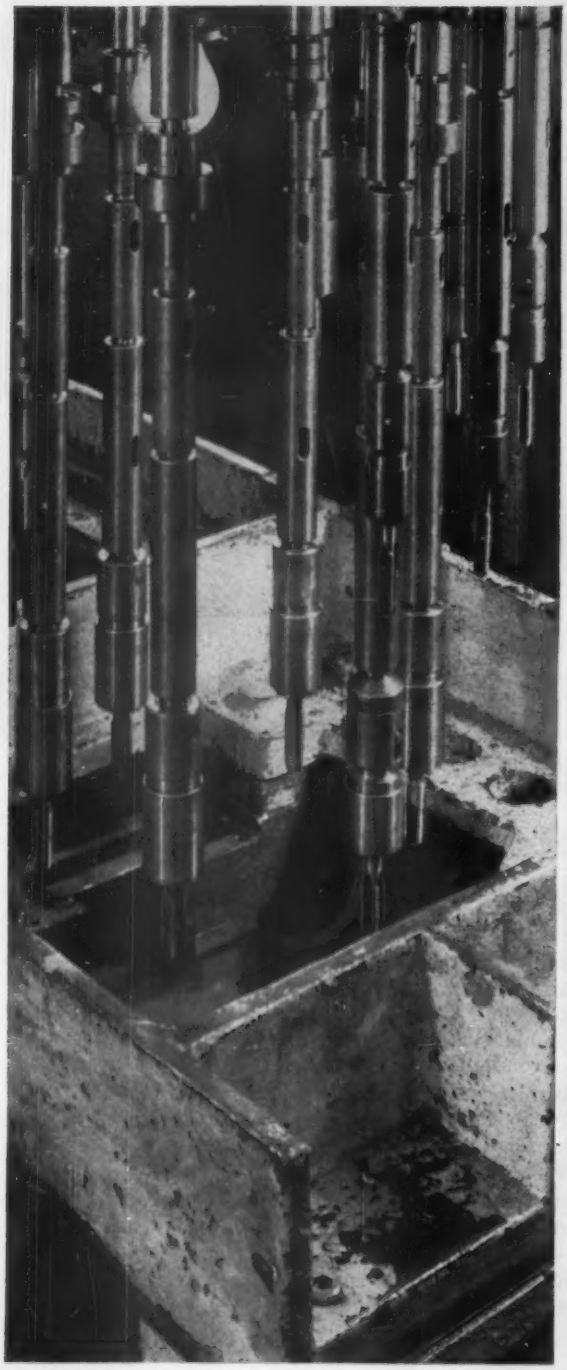
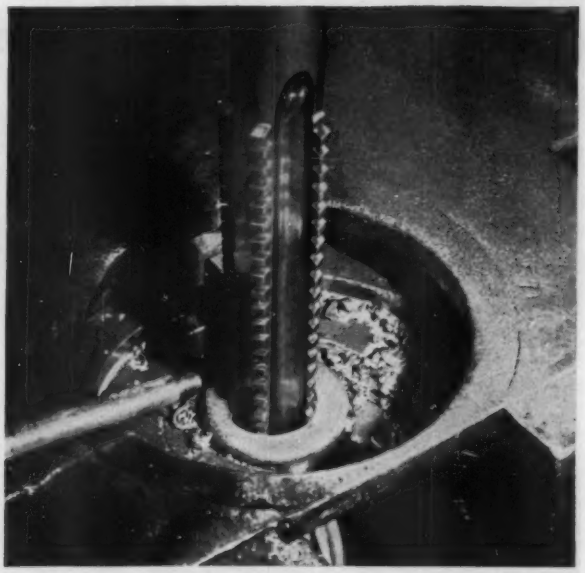


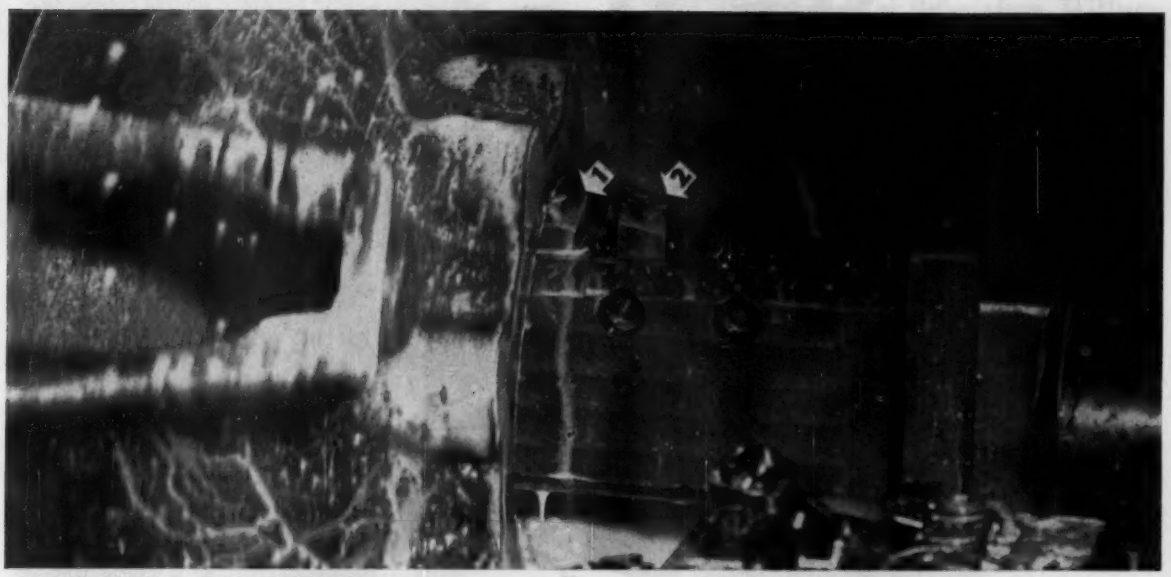
THREADING DEEP—In the production of Massey-Harris tractors at Racine, Wisconsin, Besly Taps prove their accuracy and stamina in tapping tough cast iron—one of the most severe tests of tap quality and endurance. On this automatic machine, equipped with Besly Taps, 16 deep bottoming holes are threaded in tractor frames in one operation. Besly Taps met these exacting specifications with clean-cut, economical threading.



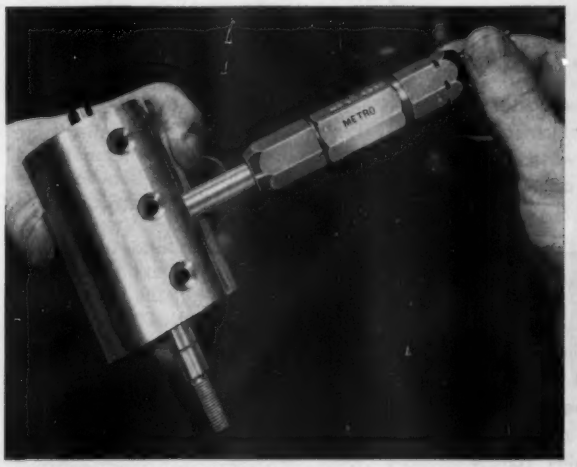
SQUARED OFF—Templeton, Kenly & Company, Broadview, Illinois, cuts heavy, almost square threads in malleable iron bases of rugged 12 to 24-ton capacity screw jacks with Besly acme taps. Notice mirror finish on flutes which promotes greater chip clearance, cleaner cutting. By using Besly's Engineering Service, this company realized lower costs and a better job. The right taps were matched to the specific workpiece.

MODIFIED TO FIT—The Gabriel Company, Cleveland, requires two concentric tapped holes in die-cast aluminum pistons used in their airplane type shock absorbers. Originally these were tapped individually—requiring 18 seconds per piece. To reduce this time, a unique set-up using Besly Taps was developed. A smaller Besly Tap is fitted inside the bored-out center of the larger Besly Tap. Two holes are now accurately tapped simultaneously in 9 seconds.

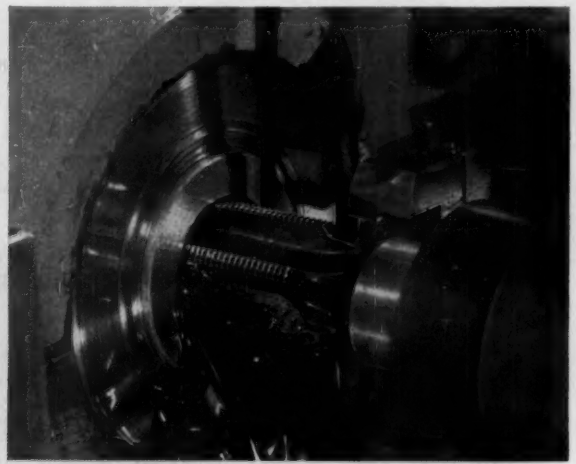
Methods . . . by BESLY



CARBIDE TOOLS IN ACTION—Heavy duty cast steel truck wheels manufactured and machined at Gunnite Foundries, Corp., Rockford, Illinois, are rough bored with a Besly BL-12-B5 Standard Carbide Tipped Tool, removing 1/8" — 3/8" of stock. On the same turret lathe a second Besly AL-12-B5 semi-finish bores, removing .030 stock. Metal removal is at 200 S.F.M. at .016 feed. First tool, arrow 1, is now about one-third through its job. Second tool, arrow 2, is set slightly higher in the same set-up for semi-finishing and follows the first tool. Besly's Engineering Service helped to achieve this set-up with the correct carbide tooling for efficient, low cost metal removal.



ASSURED ACCURACY—To assure that holes in planer cutter head assemblies provide precise fits for set screws, SKIL Corporation, Chicago, checks for accuracy with Besly-Metro Double End Reversible Cylindrical Plug Gages. Two opposed blades have three holding set-screws and another for adjusting position.



TOUGH GOING—Here you see a C-1018 high carbon steel nut being threaded by a Besly 1¾" tap. Extremely abrasive, because it has been carburized and heat treated, the material is difficult to tap. However, Besly taps tested on the work proved they could take it and were specified by the manufacturer.

Prove to yourself that Besly Cutting Tools and Gages produce better results. Put them on trial on your toughest jobs, and check the difference in longer tool life, less down time, fewer rejects and faster production. If you'd like to try Besly tools or use Besly's Engineering Service, see your Besly distributor for details, or write us . . .

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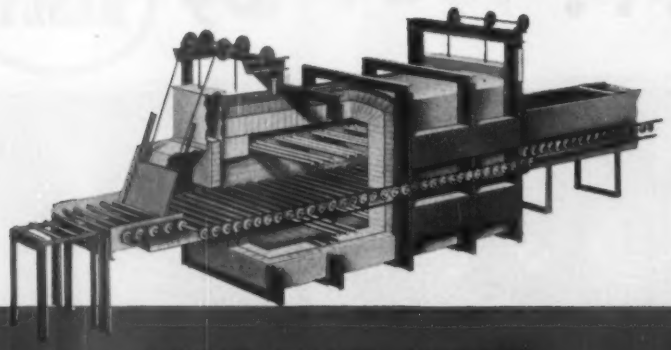

LET'S TALK ABOUT

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All these represent good reasons why electric heat treat furnaces are important considerations. For example, gas-fired and electrically-heated furnaces are frequently competitive; in fact, when total installation cost figures are considered, electric furnaces often have the price advantage.

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Electric heat is more efficiently used for applications in the high temperature range. There is a considerably smaller heat loss in the use of electricity than gas—shrinking the price spread between the two. To be specific, a thorough study must be made of all factors: local power and fuel costs, production demands, quality control standards, etc., before any final decision can be made of the type of heating to be used. Holcroft will help you—a good place to start is to send for our new book **Holcroft and the Electric Furnace.** It's yours without obligation. 5838

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Hanson being given space in Ed's department. All would have been as well as we could expect if Harrison cooperated with Ed in acknowledging the necessity of compensating Hanson's loss by hiring another man to take his place, and, of course, taking the extra work into consideration as far as Ed's budget is concerned.

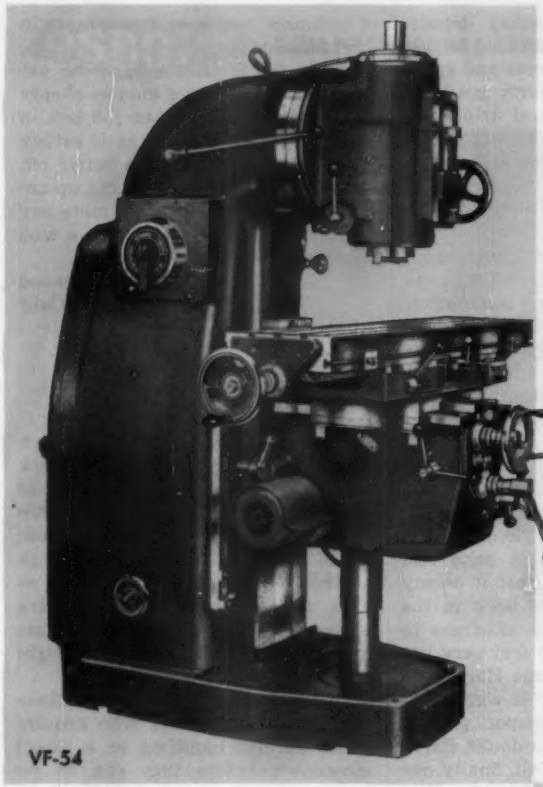
Whatever you do, Ed, don't let it get you down because ulcers are almost as prolific as mushrooms. Try a little of old Pencoyd Charlie's philosophy and go on with your regular duties and say to yourself, "Ah, to hell with it!"

Harrison Mitchell
Topeka, Kan

ED, HAS IT EVER occurred to you that Harrison may be trying to ease you out? There is nothing more disconcerting to a shop foreman than to have his superior needle him into frustration by setting up one of his pets under the guise of special activities. From the looks of things it is either a case of bull-headedness on Harrison's part or a subtle way of letting Ed know that his opinion isn't worth a tinker's damn.

I know just how Hanson feels about his favored isolation. I was placed in a similar position just fifty years ago when the toolroom foreman assigned me to bore out a large jig plate on a vertical milling machine which was located out in the main shop. I'll call the foreman Harry on account of the similarity to another one of the same name. Harry was one of these hail-bent-for-election fellows who tactfully managed to have the other fellow shoulder any burden which he found to his disliking. His favorite expression was "To hell with it; get the damn thing done." When I called his attention to several errors in the drawing that necessitated considerable recalculating, he grabbed the blueprint and headed for the long flight of stairs

"If you ask me, automation leaves the men with too much free time!"



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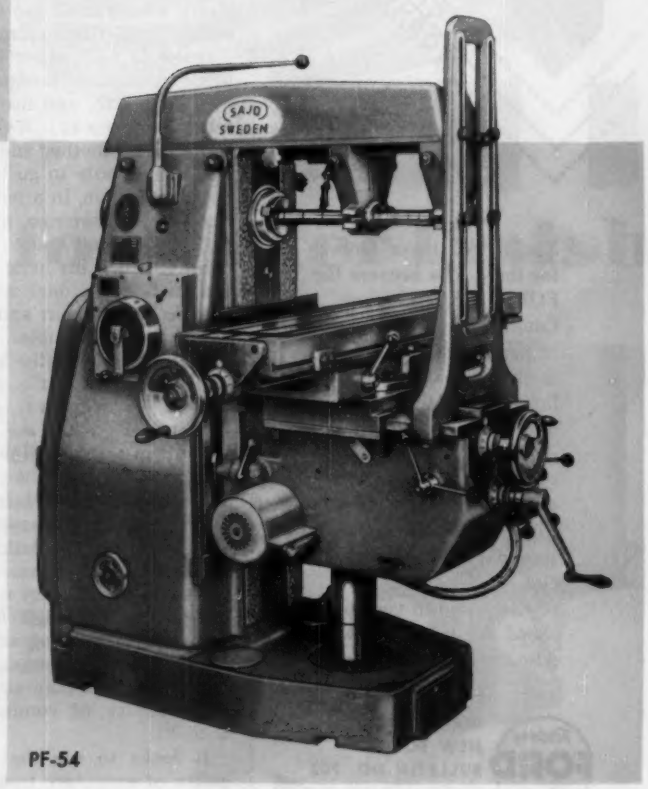

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leading to the engineering department. We no sooner had that settled when something else arose and again he headed upstairs. Harry got tired of the job after several trips and from the looks of things there were more trips to come, so he said to me, "Anything further comes up that you have to see the draftsman about, you deal with him direct."

Well! I had received a promotion without any raise in pay! I made so many trips up and down those stairs as a consequence of eliminating the middle-man that I was pooped before the job was finished. Naturally a youngster in his early twenties would have difficulties in maintaining his normal blood pressure and, as a consequence, I had to get me a larger-size derby. I felt on a higher plateau than the rest of the boys in the toolroom and likewise looked with disdain on the foreman who had shirked his job and thrust it on my shoulders. After I got back in the toolroom I detected an aloofness in Harry which made me feel very uncomfortable. Every time Harry and I spoke to each other it was like a piece of coarse sandpaper grating over my teeth, and no doubt Harry felt the same way. Well, finally one thing led to another and eventually I was ousted only to go two blocks to get a better job, in a better shop under a better foreman, at an increase of four cents an hour!

Harry stuck his neck out when he assigned me to deal with the engineering department and left himself wide open for trouble. The job was finished satisfactorily but the relationship between the foreman and one of his men was strained. In looking back I can see where I was at fault in taking a superior attitude when I returned to my old station, and I don't blame Harry one bit in biding his time to have a chance to kick me out. His failure to act as liaison between his man and the engineering department was no excuse for me getting high hat over my privilege of dealing direct. I had more constructive experience in shop trig on that job than any other I had the pleasure of coming in contact with.

It looks to me that Harrison is guilty of executive treason for placing a man in a position whereby he is likely to show his independence and treat his foreman with disdain.

The arrangement of intermingling another class of work with the regular seems to be contrary to good working theory. Ed should insist on another man being substituted for the one taken off the regular work and let Harrison know that the lack of sufficient men would eventuate in disruption of his schedule.

That's the trouble with some executives; they place a man in charge of a department and then jab him in the ribs with a spike so as to satisfy their own ego. You'd be better off, Ed, by pulling out and taking up another job as an operator at more pay than they pay for the executive who shoulders all the worries.

John Homewood
Laguna Beach, Calif

IN ANY WELL-RUN shop time and materials are charged against the work in process, and the use or abuse of these commodities determines whether the company's books show profit or loss. Any development work whatsoever should be charged as such and has no business being tacked on to current production costs, so I think Ed has every right to take a stand against it.

Evidently Harrison is one of those bull-headed characters who require either careful handling or a direct showdown before they can be induced to see the light. In Ed's place, I would keep a careful record of Hanson's time spent on the various development projects, and any other pertinent costs over a stated period of time. With all the facts assembled in black and white, I'd have another session with Mr Harrison. Sometimes a dollars-and-cents statement clearly presented has a sobering effect on those people who seem to think a foreman can disrupt normal production in this manner and still keep his costs in line.

Aside from the cost part of the sit-

"Okay, so we get fired. We still get twenty-five dollars for the suggestion."

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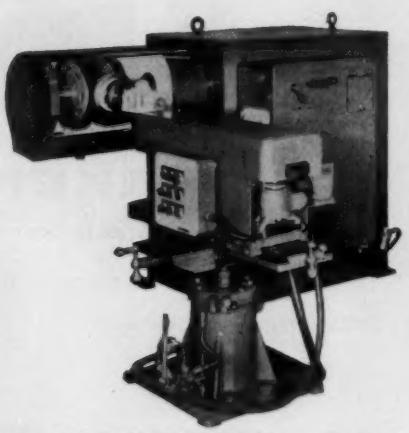

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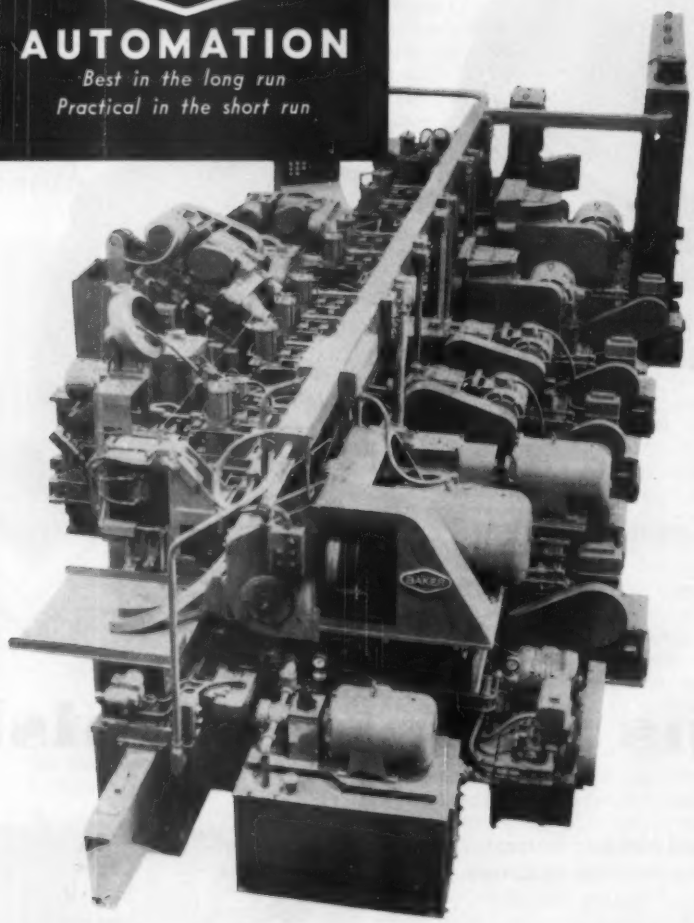

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COMPANY

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uation Ed is faced with a certain morale problem in regard to Hanson. If a foreman can't control one of his men—and in this case Hanson seems to feel that he is responsible only to Harrison—then Ed is going to suffer a loss of face in his own department. No foreman can operate at full efficiency without the knowledge that his authority is respected by management and men.

If Harrison wants development work done, it should be done on a separate cost basis, on an appropriation set aside for this purpose. If the company feels that this work is important enough to warrant men and machines for this purpose, then a portion of the shop space should be allotted for this under clearly defined supervision.

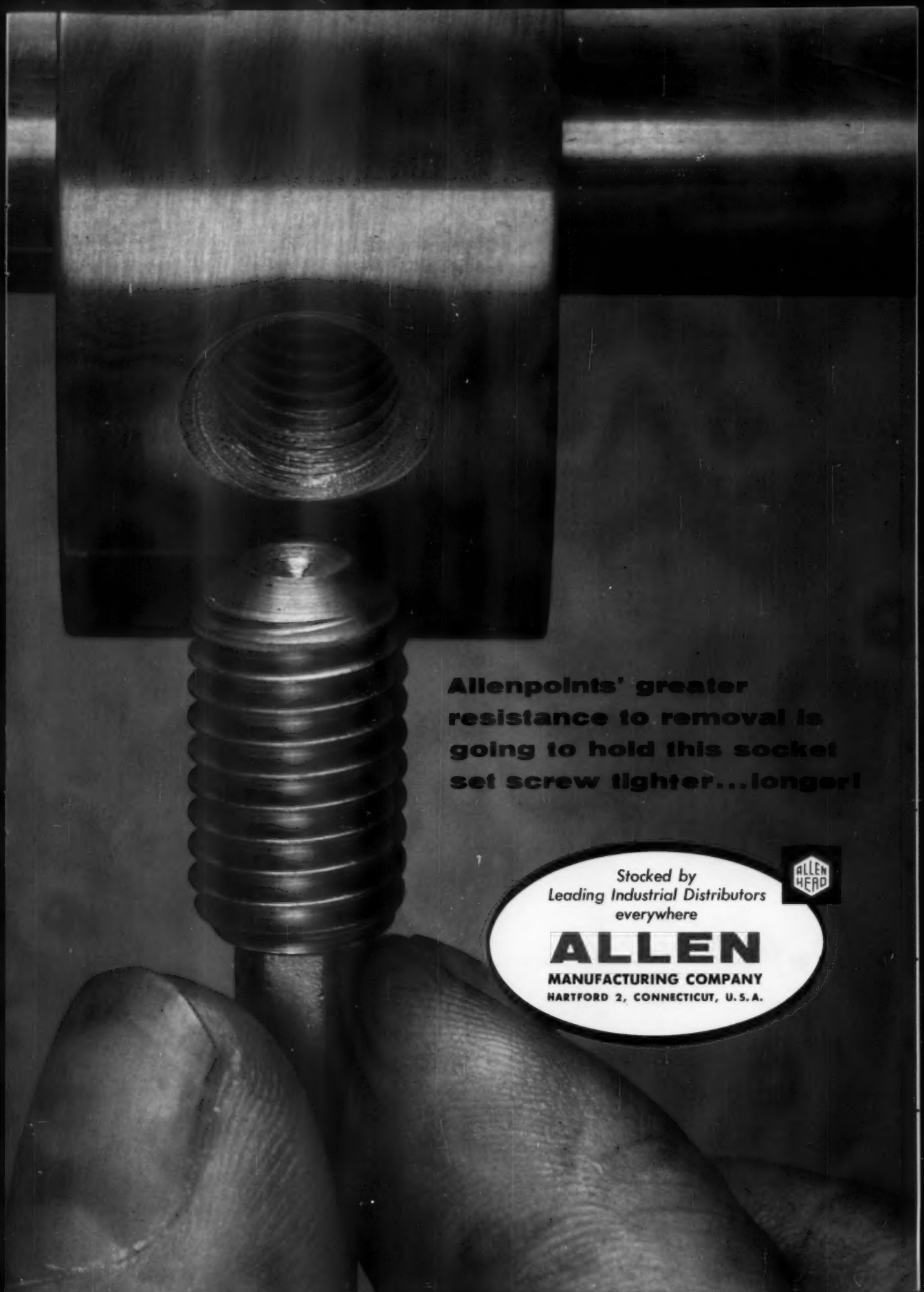
In other words, if Harrison wants Ed to supervise this development corner in addition to his other duties then it should be made plain to all concerned, particularly Hanson, that Ed has full control. If Harrison has any ideas to be worked on for development they are to be transmitted through Ed, and any attempt to go over his head be strictly dealt with. In my opinion that is the only businesslike approach to this problem, and the only approach that should commend itself to the self-respecting foreman.

Robert S Alexander
Glastonbury, Conn.

I ONCE WORKED for a company that had a "development corner" in my department. After it had been in operation for a while, the department foreman devoutly wished he had not been picked for this new wrinkle with its bag of headaches for him.

It all started with the setting up by the front office of a development committee composed of representatives of the sales, manufacturing, engineering and planning departments. The committee met monthly

"Well, I'll tell you, boss, I figured if I was gonna work for coolie wages, I might as well dress the part."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MACHINES AND ATTACHMENTS

1 COMPLETE CINCINNATI CATALOG—*Cincinnati Milling Machine Co, Cincinnati 9, Ohio.* 71-page general catalog M-1961 contains illustrated descriptions and specification data on various lines of current products. Sections cover milling, broaching, and grinding machines; cutter and tool grinding units, grinding wheels; cutting fluid; selective hardening machines; metal forming machines; special machine tools.

2 LATHES—*Sidney Machine Tool Co, Sidney, Ohio.* 8-page bulletin 1256-1 describes and illustrates construction features of Dial-Master Model 32 available as the 2013 (formerly 16 in.) and the 2516 (formerly 20 in.). Respective capacities: 21½ and 25¾-in. swing; 30 and 48-in. center distance; 32 spindle speeds; range of 15 to 2000. Specification page gives complete details for both.

3 HYDRAULIC COPYING EQUIPMENT—*Wharton Unitools, PO Box 202, Valley Stream, Long Island, NY.* 20-page catalog contains data on Hyprofile equipment for profiling and 2 and 3-dimensional machining made by Armytage Ltd, England. Applications illustrated.

● DYNA-SHIFT LATHES—*Monarch Machine Tool Co, Sidney, Ohio.* 16-page bulletin 1603 illustrates and describes design features of Series 80 including automatic calculation and setup of spindle speeds, finger-tip hydraulic shifting. Specification details given for five models. Request direct on company letterhead.

4 AUTOMATIC MULTICYCLING COPYING LATHE—*Cone Automatic Machine Co, Pilot Div, 90 Rockefeller Plaza, New York 20, NY.* 6-page illustrated bulletin covers design details of hydraulically controlled Conomatic-Pilot unit. Includes diagrams of series of typical parts profile-turned, with dimensions, machining times, and tool arrangement used for each.

5 TURRET PUNCH PRESSES—*Wiedemann Machine Co, 4272 Wissahickon Ave, PO Box 8794, Philadelphia 28, Penna.* 6-page bulletin 500DM contains information on line of 40 to 150-ton-capacity machines equipped with direct measuring gage and table. Units locate and pierce holes in large work in one handling.

6 AIR-OPERATED SHEARS—*Curry Air Shear Corp, 941 Oliver Bldg, Pittsburgh 22, Penna.* 13-page catalog illustrates and describes line. Specifications, applications, operating procedure included.

7 MACHINE TOOL ATTACHMENTS—*E F Vilter Co, 4101 N Richards St, Milwaukee 12, Wis.* Bulletins give illustrated information, applications, specifications for drilling attachments, spring centers, keyway and hole locator, threading tool for lathes, boring bars, and feed mechanisms for turret lathes.

TOOLS AND ACCESSORIES

8 "CARBIDE DIE SHARPENING PROCEDURE"—*Oberg Manufacturing Co, Silverville Rd, Tarentum, Penna.* 8-page illustrated bulletin 356 covers equipment, wheel selection, speeds and feeds, check for run-out, dressing the wheel, prior inspection, and operational details.

9 CHUCKS—*Buck Tool Co, 2015 Schippers Lane, Kalamazoo, Mich.* 24-page general catalog covers line including 6-jaw scroll chuck, Adjust-Tru power chuck, compensating power unit, keyway independent, and dustproof chuck. Lists mounting plates, accessories, and power unit components.

10 INSERTED-BLADE CUTTERS—*Morse Twist Drill & Machine Co, New Bedford, Mass.* 16-page catalog 50-1B covers line of wedge-design units including half-side milling, face-milling, staggered-tooth side milling cutters; shell end mills, and end mills with No. 50 National Standard shank.

11 MARKING MACHINES—*Jas H Matthews & Co, 3942 Forbes St, Pittsburgh 13, Penna.* Illustrated leaflets cover line of general purpose machines for marking round, flat, or contoured products. Details on line ranging from bench models for intermittent, light-duty applications to machines capable of marking at up to 6 tons of table pressure.

12 ADJUSTABLE INDICATOR GAGE—*Ellstrom Inc, 22038 Beech Rd, Dearborn 8, Mich.* 4-page illustrated folder lists prices, specifications, and applications

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for three standard Shalo-Chek models, including range of shallow dimensions which can be checked with each.

13 OPTICAL INSTRUMENTS—*Bausch & Lomb Optical Co, 635 St Paul St, Rochester, NY.* Booklet D-1059 contains application data on magnifiers, microscopes, wide field tubes, macroscopes, and comparators.

HEAT TREATING AND WELDING

14 ELECTRODE DATA BOOK—*National Cylinder Gas Co, 840 N Michigan Ave, Chicago 11, Ill.* 24-page illustrated booklet NH-504 gives information on AWS-ASTM arc welding electrode specifications; how to estimate electrode consumption; summary of welding symbols; factors in selecting electrodes; hardness conversion table.

15 CONTROL EQUIPMENT FOR RESISTANCE WELDING — *General Electric Co, Schenectady 5, NY.* 8-page bulletin GEA-5945A explains benefits of synchronous precision control, lists typical areas of application, describes components and accessories, discusses use in spot or seam welding, combination, and bench welding.

16 CONTINUOUS HEAT TREATING FURNACES—*Surface Combustion Corp, Toledo 1, Ohio.* 4-page bulletin SC-177 illustrates and describes standard rated units. Contains specifications, process recommendation and application examples for snap hearth, cast alloy link belt, and brazing furnaces.

17 CONTROLLED - ATMOSPHERE WELDING—*Leader Welding & Manufacturing Co, 2418 Sixth St, Berkeley 2, Calif.* 20-page bulletin gives specifications and description of expandable chambers with matched vacuum pumping units, instrumentation and controls, and various accessories and attachments available for controlled-atmosphere welding and metallurgical research.

18 IRON-POWDER ELECTRODES—*Hoeganaes Sponge Iron Corp, Riverton, NJ.* 6-page folder 106 covers performance factors, AWS specifications, operational characteristics.

PLANT SERVICE EQUIPMENT

19 MATERIALS HANDLING EQUIPMENT—*Allis-Chalmers Manufacturing Co, Milwaukee 1, Wis.* 20-page illustrated catalog BU-305 describes design, engineering, construction, and operating features of fork lift trucks, towing tractors, and Chore Boy platform trucks. 8-page bulletin 387 covers new line of clamping attachments for A-C lift trucks; dimensions, specifications included.

20 OIL HYDRAULIC PUMPS—*Webster Electric Co, 1900 Clark Ave, Racine, Wis.* 16-page illustrated brochure H3A2 details function and design of oil hydraulic units, tandem pumps, and motor-pump combinations and control valves for variety of installations.

21 BLAST CLEANING EQUIPMENT —*Pangborn Corp, Hagerstown, Md.* 20-page bulletin 703 describes automated techniques for high-speed cleaning; construction features of Rotoblast units; layout aids; special section on abrasive coverage; specifications and dimensions for Blastmaster Barrels from 1½ to 27-cu-ft size.

22 FLUID POWER PUMPS—*Oilgear Co, 1560 W Pierce St, Milwaukee 4, Wis.* 4-page bulletin 46601-B illustrates and describes continuous pressure, constant displacement, heavy-duty Type HG units. Performance data and suggestions on fluid power systems for pushing, pulling, lifting, lowering, and holding included on 3 to 10-hp, 1 to 5-gpm, 3000 to 5000-psi pumps.

23 PANEL WIRING TECHNIQUES—*Stahlin Brothers, Inc, 217 Maple St, Belding, Mich.* 8-page bulletin S-301 outlines new raceway techniques for wiring of electrical and electronic equipment. Guide provided to all standard Panel Chanel raceways, giving specifications, part numbers, and sizes.

PARTS AND MATERIALS

24 COLD-ROLLED SPRING STEEL—*Wallace Barnes Steel Division, Associated Spring Corp, Bristol, Conn.* 48-page "Fact Book" describes essential qualities, various grades, applications; technical data on hardness values, selection of analyses, suggestions on blanking and forming parts, and subsequent hardening and tempering.

25 HIGH-PRESSURE HYDRAULIC VALVES—*R D Wood Co, Public Ledger Bldg, Philadelphia 5, Penna.* 8-page illustrated catalog lists and describes 24 styles ranging from 1500 to 20,000 psi in working pressure. Covers check, stop, and operating valves, and a wide variety of special valves.

26 FABRICATING STAINLESS STEEL —*Republic Steel Corp, 3100 E 45th St, Cleveland 27, Ohio.* 40-page manual (Adv 590a) gives latest data on approved techniques. Sections cover cold forming and other fabricating methods, and recommended practice after fabrication.

● GEARS—*Horsburgh & Scott Co, 5114 Hamilton Ave, Cleveland 14, Ohio.* Catalog 57 contains information on gear materials and heat treatment, gear cutting capacities for all H&S gear types, tooth forms, lubrication specifications, shaft size formulas and tables. Request direct on company letterhead.

27 AIR COMPRESSORS — *American Brake Shoe Co, Kellogg Div, Rochester 9, NY.* 20-page catalog covers line of 1/3 to 20-hp units. Specifications on single and two-stage models, portable models, tanks, pumps, and accessories; charts and data on compressed air included.

● SOCKETS—*Apex Machine & Tool Co, 1026 S Patterson Blvd, Dayton 3, Ohio.* 7-page illustrated catalog 129 describes complete line of fast lead and surface drive sockets. The former are designed for high-speed nut running, the latter for applications where perfect alignment of socket and nut or bolt is not always possible. Request direct on company letterhead.

28 CLINCH NUTS—*Keylock Division, Kaynar Co, Box 2001, Terminal Annex, Los Angeles 54, Calif.* 8-page brochure gives details on flush-mounted self-locking clinch nut. Includes specification data; describes advantages, temperature resisting qualities, simplified installation method.

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Design Features:

- **Large and wide "Zero Precision" Tapered Roller Spindle Bearings**—permit operation at all speeds, retain accuracy, end expensive bearing maintenance costs.
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Write for New Catalog G-55

SHELDON MACHINE CO., INC.

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to consider changes in the product brought to light by ideas encountered in the field by the sales department, and re-examined by all departments to see if a change in design of the product would result in a better quality and a lowering of costs. New developments involving substitute materials which could be put to work much more efficiently and economically if the design was changed to ease production problems were brought up in the committee meetings. Suggestions from design, sales, and manufacturing people to get a better product were given critical examination, and development projects were set up and allocated to various departments and shops.

This was an admirable arrangement for evolving a better product at lower cost. However, the company erred in not setting up a separate department to handle this type of work. What it did was to have workers in various shops put on development work on a part-time basis in development corners in their particular shops.

The result was trouble for the foremen in those shops in meeting regular scheduled work because of lack of control and service of workers engaged in special development work. The men picked for development work were usually the best workers in the department. They worked with the committee in further development of selected projects involving new design and redesign. These workers were moved to a part of the shop away from the rest of the men due to the nature of the new work and the constant visits of members of the engineering department also en-

"Good heavens! I keep forgetting that you work the night shift now."

gaged on the projects. As it turned out, the foreman of the department had little control over the activities of the development corner of his shop.

Removing selected workers from their regular jobs hindered the foreman in meeting his scheduled work since no replacement for them was made by the front office. The boys up front claimed that the selected workers would not be busy on development work exclusively, that they could work on regular assigned jobs during periods when development projects petered off. But in actual practice it didn't work out that way. As a result of this arrangement, the foreman got no regular work out of the development workers' time in his shop. Members of the engineering department engaged on development work would by-pass the foreman and work directly with the mechanics engaged on the project. However, management later found it necessary to set up an independent experimental department for new developments due to the increase of experimental projects.

Based on this experience, I believe the best arrangement for handling experimental development work is to establish an independent department. The development corner setup raises too much interference with regularly scheduled work in the shop and is inefficient in meeting the needs of special development work. By setting up a separate department, under the full-time direction of a selected foreman, and permanently assigning skilled workers from the different shops and trades to this group, a more effective arrangement for handling development work is possible. Also, development costs can be better accounted for when an independent experimental department is set up.

In the case under discussion, the foreman should keep a record of the actual time his man devotes to development work and the effect of this lost time on his regular scheduled work. He should present this tabulation to his supervisor with a request for a replacement. Sitting tight and waiting to see if the development corner is a temporary arrangement will not help the foreman in meeting his scheduled work. He can convince his supervisor that the need for a replacement exists if he backs up his request with actual time-loss figures.

The way new developments in metalworking are popping all over the place is an indication that desirable changes in production and products are becoming more evi-

TEST YOURSELF

on gaging a split thousandth

(See correct answers below)

This is only *one* type of standard O.G.P. Micro-Gage Chart Line used for quick checking of close tolerances on your optical comparator. Micro-Gage Charts are an optical adaptation of the toolmaker's way of checking his work by comparing it to a straight edge against the light. A crack of light is easy to see . . . much easier than trying to guess whether a part shadow coincides with or falls between parallel lines on a chart. That's why O.G.P. Micro-Gage Charts, printed from precision-scribed masters, permit lower magnification, thus often eliminate costly mechanical shifts in your fixtures. Operators report: (1) Improved accuracy; (2) faster checking; (3) Less indecision. Our experience can help you determine *when* to use Micro-Gage Charts and *which* type will best suit your job.

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We also supply all types of standard charts, custom charts, layout accessories, fixture bases, and custom fixtures to meet your specialized requirements.

Answers to above test:

1. Part acceptable. 2. Part oversize. 3. Part undersize.

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OPTICAL GAGING PRODUCTS, INC.
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dent in today's fast-moving industries. Close cooperation between the product designers and manufacturing departments is mandatory to meet competitive conditions and insure better designed products at lower manufacturing costs. An independent department for new developments may entail added initial costs but it will be worth the time, attention, and money in days to come and give rich promise for developing better products at lower cost.

Harry Kaufman
Philadelphia, Penna

TROUBLE BOARD

What's the best way to give the breeze to a complaining worker who's been stung by buying something listed for sale on the department bulletin board? Should the company supervise notices put up on the board?

The shop bulletin board can be a trouble board for the shop foreman. Amateur foremanship can be a greater source of trouble to the enterprise the foreman helps manage. Some foremen have a knack of pouring oil upon troubled waters; others have a knack of pouring oil upon a smoldering fire.

An employee with a little time to kill looks over the shop bulletin board. He learns of a rare bargain in a good used car. He buys it. He gets cheated. He blames everyone but himself.

Such an employee has no legitimate gripe against the company. However, he thinks that he has. This is just as bad. The employee, looking for sympathy, cries on his foreman's shoulder. It's the foreman's job to be sympathetic and to see that the bulletin board does not become a source of trouble in the future.

A foreman's most important task is to motivate men. The easiest way to motivate an employee is to give him what he wants. One of the three primary wants of an industrial employee is a sympathetic understanding of his personal problems.

Since an ounce of prevention is worth a pound of cure, it behooves management to exercise close control over all notices placed on its bulletin boards. Encase the board with a glass door. Keep a lock on the door. Funnel all the notices to be placed on the board through one man.

There's another less costly, less certain method to prevent the bulletin board from becoming a trouble board. Place a "Caveat Emptor" sign on the board. The boys will make it their business to find out what this means. If they feel cheated they'll be more apt to lick their own wounds.

Trouble, real or imaginary, is not always preventable. It is now high time that management learned that when there is not a sympathetic foreman around there is sure to be a sympathetic shop steward on the job.

Peter A Seward
Swampscott, Mass

"See . . . nothing happened."

It is generally understood that the company can take no responsibility for any statements placed on the bulletin board, except those which are officially signed by the company manager.

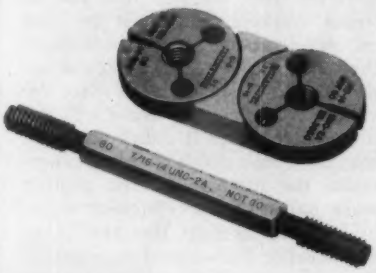
It would be unreasonable to expect all items that are offered for sale or exchange to be thoroughly investigated and checked before the notice is permitted on the board. Ever since money was coined and used as a medium of exchange the buyer has always had to use common sense and check what he was buying before making payment and, so long as there was no misrepresentation, the exchange should be final.

Al has nothing to do with it and he should, once and for all, make that very clear to Hank. If Hank,

(Continued on page 232)

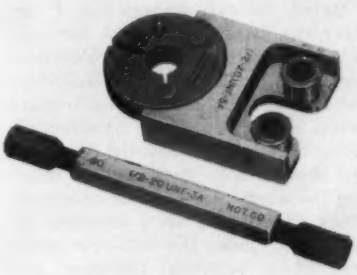
(Advertisement)

. . . AND FOR YOUR THREAD-INSPECTION JOBS BEST HANDLED BY P&W CONVENTIONAL GAGES . . .



"GO" and "NOT GO" RING GAGES

provide a functional check at maximum metal limit and a pitch diameter check at minimum metal limit.

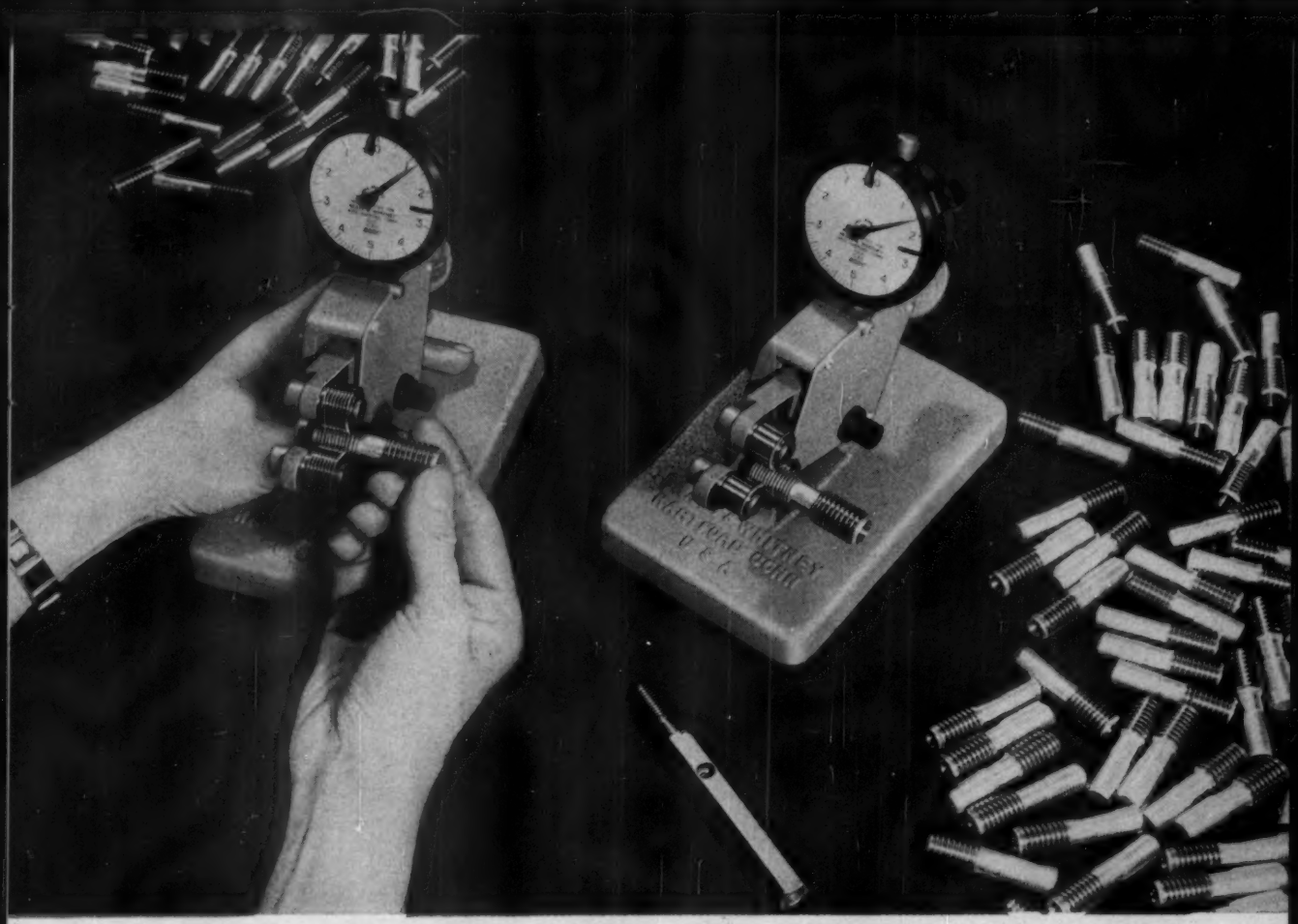


RING-SNAP LIMIT THREAD GAGES

provide a functional check with a "Go" ring at maximum metal limit and an actual pitch diameter check at minimum metal limit with single-rib radius rolls of best wire size.

ROLL THREAD SNAP GAGES

provide a functional check with multiple-rib "Go" rolls at maximum metal limit and a pitch diameter check at minimum metal limit with 2-rib "Not Go" rolls.



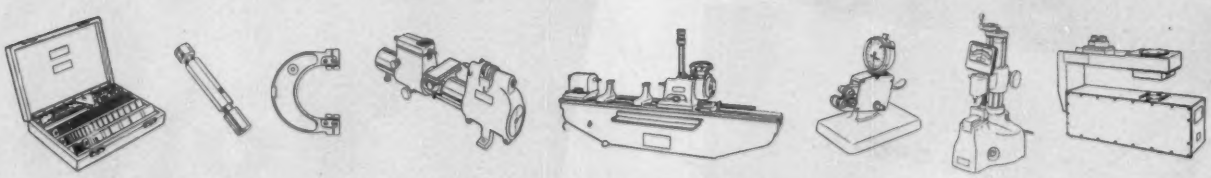
CHECK CLASS 3 and 3A THREADS *on a Production Basis*

. . . QUICKLY, DEPENDABLY AND ACCURATELY WITH A P&W TRI-ROLL THREAD COMPARATOR

Here for the first time is a *production gage* that duplicates the precise 3-wire thread measurement method. Equipped with single-rib rolls, the P&W Tri-Roll Thread Comparator provides this *critical check at actual pitch diameter* which is essential in producing threads to meet Class 3 and 3A standards. Equipped with interchangeable full-length rolls, it also provides a *complete functional check* . . . detecting "drunken lead" and deviations in lead, roundness, angle, and pitch diameter.

Today, a greater demand is placed on you for higher precision. A fast-growing percentage of threads must now be produced to meet Class 3 and 3A standards. Be sure your quality control methods are geared to keep pace with this growing demand . . . efficiently and profitably. Write now for complete information on P&W Tri-Roll Thread Comparators.

Pratt & Whitney Company, Incorporated,
11 Charter Oak Boulevard, West Hartford, Conn.



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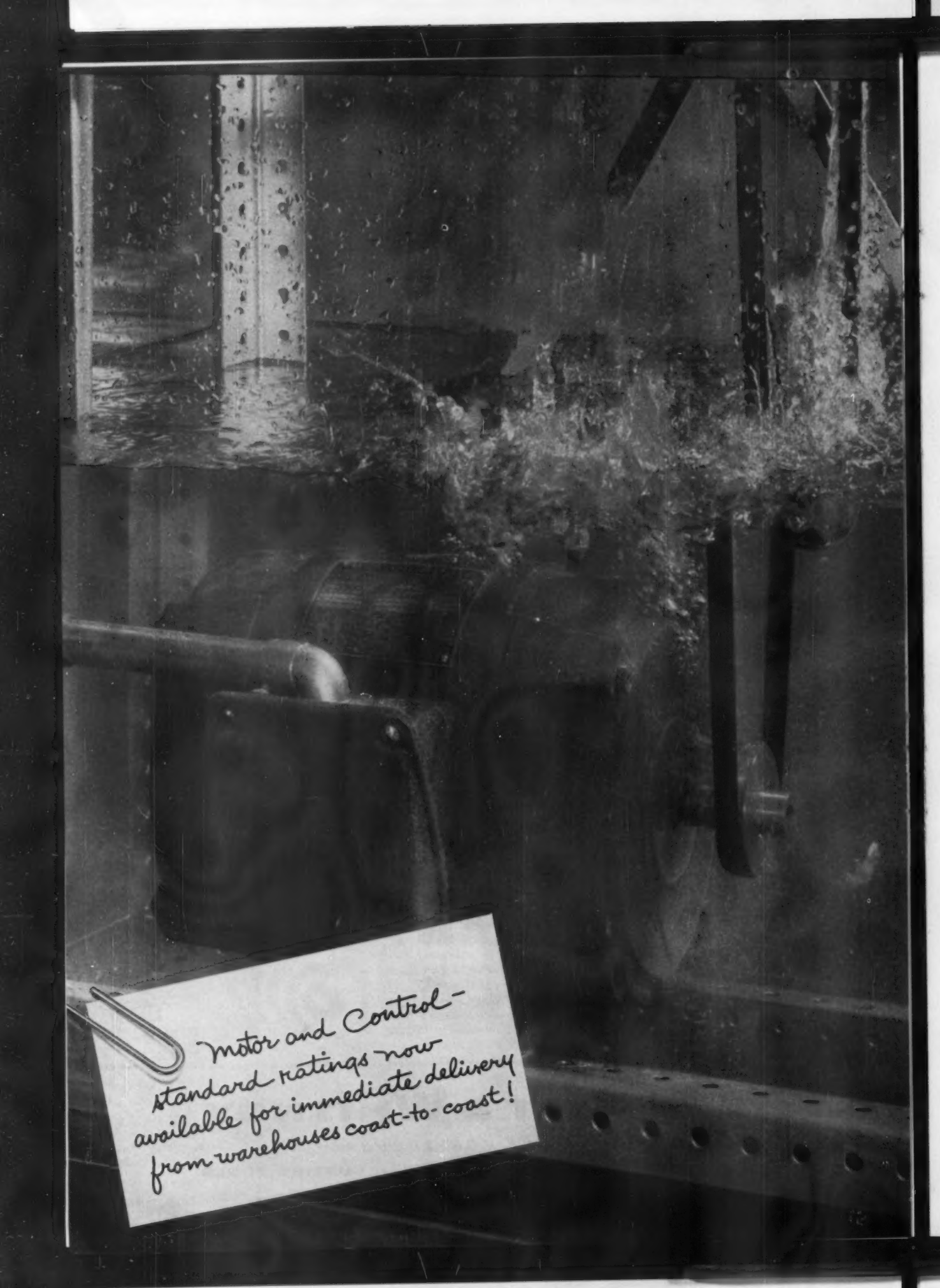
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standard ratings now
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TOMORROW:

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The New Life-Line A Is Another Step Closer

Today's standard motors cannot long endure the water conditions shown here. But Westinghouse is working toward a standard motor that can "live" with water like this tomorrow.

Meanwhile improved frame design, insulation and bearing protection give the Life-Line® "A" more protection than ever before. It can withstand more water and other contamination than any other motor you can buy. It's industry's closest approach to a standard motor that can operate with or within water—in any amount.

Your Westinghouse sales engineer can show you many additional reasons why the Life-Line "A" is industry's most advanced and preferred motor. Call him today.

J-21924-A

New cast-iron frames and brackets utilize the finest grained castings with uniformly thick-walled sections precisely fitted and sealed—another reason why the Life-Line "A" is so preferred.

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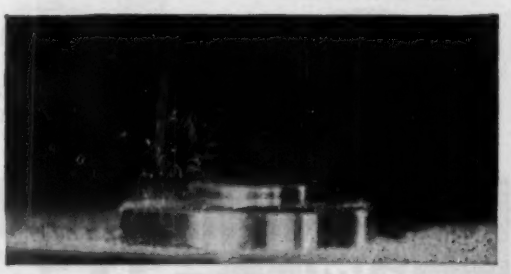
Westinghouse



Two outer seals of new 4-way sealed bearing act as flingers and literally throw off damaging contaminations. Inner seals, attached to outer bearing race, are stationary and form a positive labyrinth.

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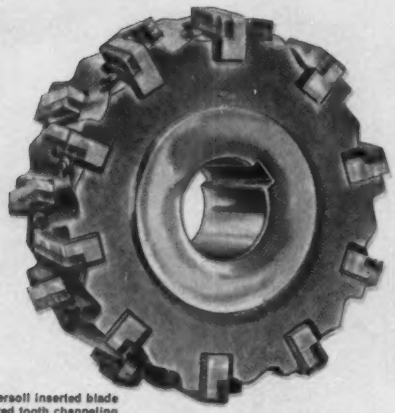
Los Angeles 22 · Chicago 35 · Cincinnati 37 · New York 51

after this warning, continues to make a nuisance of himself then he should be referred to the personnel department for transfer or discharge. Al's position is to keep a flow of accurate work coming through the shop at a cost low enough not only to show a profit, but low enough to be assured of repeat and additional orders. He has no right to be wasting his time trying to placate some sorehead who can't grow up and fight his own battles to protect himself against any slick character who may offer him something for almost nothing.

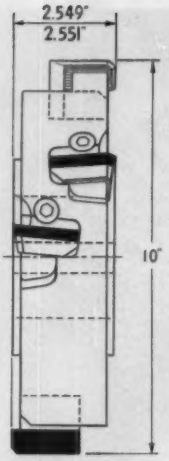
There may, however, come a time when someone really tries to pull a questionable trick and then the company may have to step in to see that justice is done. A raffle was held at one large concern I know of and the one holding the winning number was to receive a motorcycle which belonged to a foreman who had just bought himself a new car. The drawing was held late one night at the foreman's home and only a few of the fellows were there. The numbers were on slips of folded paper in a tin box and the fortunate owner of the winning number was the foreman's son so the motorcycle stayed with the family. A few days later the superintendent learned about the affair and also discovered that not only had the foreman's son won the drawing but that no one had seen the numbers before they were put in the tin box—in fact it was quite possible that all the slips of folded paper could have had the same number written on each, thus making sure who the winner would be.

This may or may not have been

"Give out the notices of the salary increases at the end of the day. Let them faint on their own time."



Ingersoll inserted blade staggered tooth channeling cutter—2900X series, page 46, catalog 66

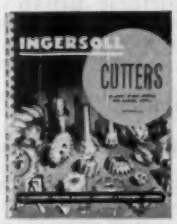


INGERSOLL CUTTER removes 2700 cu. in. of 1045 steel without resharpening at The Bullard Company

This ten inch, inserted blade, staggered tooth channeling cutter used by The Bullard Company, manufacturers of machine tools in Bridgeport, Connecticut, demonstrates long tool life of Ingersoll cutters on tough jobs. The cuts are 2½" wide. 1⅜" deep at a cutting feed rate of 6" per minute. The parts to be cut are 67⅝" long tool slides for the Bullard "Cut-Master" turret lathe.

The advantages of long life and dollar savings made possible by Ingersoll inserted blade cutters are being realized on all makes of machines, milling and boring a wide range of materials. An Ingersoll Cutter Division representative will be glad to discuss this and other long-tool-life experiences with you.

Whether you are concerned with tool life, feed rates, cutter costs or finish, the new Ingersoll cutter catalog will be a valuable guide. Write for your copy today, address Dept. 66K.



Use this new 82 page guide for selecting the right inserted blade milling and boring cutters for your work. Write for catalog #66, today.

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Announces a New and even Greater Value in their . . . STANDARD STEEL GAGE BLOCKS

The new tolerances of these blocks are a special feature +.000008" —.000004" . . . parallelism and flatness .000003" . . . surface finish .6 — .8 micro inches rms.

Be on the safe side. Be sure your quality control is accurate — order a set of the new Webber Blocks today.

Complete 84 Block Working Set, sizes from .050" to 4.000", at a remarkably low price, only

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Including two .100" Steel Wear Blocks

Same set as above, but with two .100" Croblox wear blocks

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true but, nevertheless, it was a question in some of the men's minds. The superintendent promptly called in the foreman and told him that members of his family should never have been permitted to own chances in the raffle and that everyone's money was to be returned immediately, otherwise the foreman could not retain his position with the company. He was, however, permitted to save face by issuing a statement that since it was his own son who won the motorcycle he did not feel justified in also keeping the money and that everyone could have their money back upon request.

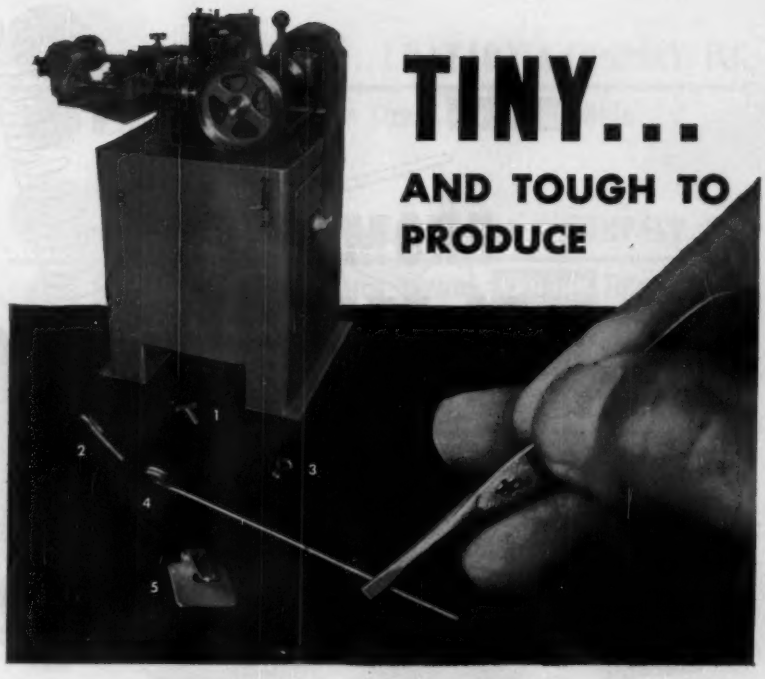
George P Pearce
Albuquerque, NM

It is very unusual for a man to assume that the foreman of his department is his guide and protector in the matter of buying and selling articles as result of company-sponsored publicity.

The average company who assists its employees in the buying, selling, and exchange of goods is assuming that it is conferring a favor on those who use the service. Complaints from disgruntled buyers may cause a company to question the wisdom of continuing an advertising or market service for its employees and it would be unfortunate if they did so, because these services are usually appreciated greatly by employees and work for contentment and better labor relations. One isolated complaint from a fat-head should not result in a useful service being withdrawn from other employees.

If the buyer bought a faulty car as a result of a newspaper adver-

"There she is, boss—pickled, primed and painted."



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Small wire and ribbon metal forms shown here in actual size are typical examples of modern precision production on a Nilson #00 4-Slide. Compact in size, this 4-Slide produces up to 375 pieces per minute in material not exceeding .040 dia. and 3" in blank length. Easy access to tooling, accurate feeding to within .003, and rugged construction assures years of precision forming.

1 Mercury Switch Part . . . .014" x .019" platinum wire, formed with tolerances within .001" on over-all length. Production rate, 175 per minute.

2 Electrical Contact . . . .0076" x .0030" wide phosphor bronze formed at a production rate of 200 per minute.

3 Swivel Part . . . .025" brass wire. Heading operating includes eye formed with tolerances within .008", shank within .003 tolerance. Production rate, 300 per minute.

4 Leadwire . . . .026" soft tinned copper wire formed at a rate of 140 per minute with two 7/64" diameter windings.

5 Contact Part . . . .010" x 3/16" wide phosphor bronze formed at 175 per minute.

Nilson makes a complete line of versatile 4-Slides . . . accommodating wire diameters up to ½", feed lengths up to 32", and ribbon metal up to 3" width . . . with press capacities ranging to 75 tons.

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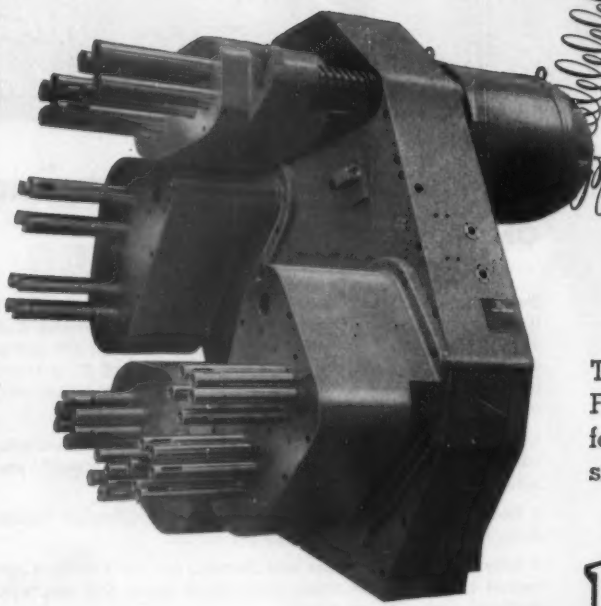
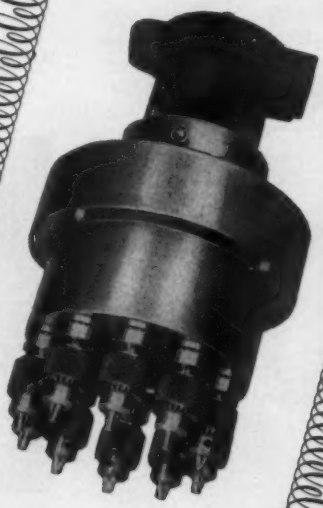
FROM THEN...
...TO ETERNITY





1924

The U. S. Drill Head Company's first Fixed Center Drill Head was produced for Borg and Beck, of Chicago — a subsidiary of Borg-Warner.

1957

The 50,000th Head was shipped.

For men who know drill heads best, it's always U. S. Drill Head ...5 to 1

Since 1915, when the U. S. Drill Head Co. built its first adjustable head, it has far surpassed all other similar manufacturers because of its engineering and production facilities.

Manufacturers of all types of adjustable, fixed center and individual lead screw tapping heads.

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tisement, he would have no redress from the publisher of the paper. In like manner, the bringing together of buyer and seller does not place any responsibility on those who perform the service that the goods are guaranteed.

In any well-organized company, the settlement of grievances arising out of company methods is, surely, the job of the company. I fail to see how the foreman comes into the matter; his job is to get production and not to act as citizen's advice bureau. The plaintiff should complain to the vendor of the dud car he bought and if he thinks he has a case, he should seek legal advice outside the company. Anyway, I always thought that in the matter of buying second-hand cars, the buyer was entirely on his own and once he had parted with his money he had no redress if the vehicle turned out to be faulty. It is very rare that anyone hears of a successful civil action being won by the buyer of a second-hand car.

Some companies publish a newspaper or journal for circulation among their employees and the devoting of free space for advertising second-hand goods can be a very popular feature. Most of the buyers of goods advertised in such newspapers are delighted with their purchases. Poor stuff is not usually advertised because the seller does not want to have to spend his time for years ahead avoiding contact with a fellow employee who made the purchase.

In the case of the complaining employee who thought he had been swindled—it is very useful for a

(Continued on page 240)

"Maybe we better call in a brain specialist."

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A Progress Report on Faculty Salaries:

UP . . . But Not Nearly Enough

THE CHART on this page provides a report of the progress being made in solving a problem of crucial importance to every American. The problem is that of seeing that college and university faculty members get decent salaries.

This new chapter, which brings the story forward two years—from 1954, when it was last dealt with in this series of editorials, through 1956—has a decidedly cheering element. For in the last two years faculty salaries have made real headway.

Two Years of Improvement

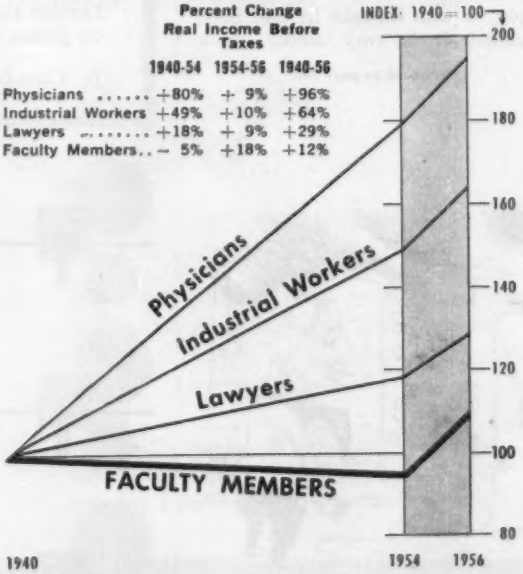
In 1954, in terms of what their salaries would buy, faculty members as a whole were actually worse off, by 5%, than they had been fourteen years earlier. As the chart shows, over the same period the real income of the average industrial worker had increased by almost half. And, in what it would buy, the income of the average physician, with professional training comparable to that of the average faculty member, had jumped by 80%.

In 1956, however, the average faculty salary would buy about 12% more of goods and services than it would in 1940. Relative to where they were two years before, faculty salaries showed a larger gain over the two years than those of any of the other groups whose salary progress is charted.

This movement of faculty salaries in the right direction has many contributing causes. The biggest single boost was given by the great Ford Foundation gift of half a billion dollars to our colleges, universities, and hospitals, almost half of which was ear-marked for faculty salary increases. Gifts from business firms have also

What is Happening to College Faculty Salaries

Percent Change Real Income Before Taxes	1940-54	1954-56	1940-56
Physicians	+80%	+ 9%	+96%
Industrial Workers	+49%	+10%	+64%
Lawyers	+18%	+ 9%	+29%
Faculty Members	− 5%	+18%	+12%



DATA: Council for Financial Aid to Education, U. S. Dept. of Commerce, U. S. Dept. of Labor, National Association of Education Research Dept., McGraw-Hill Dept. of Economics.

helped a lot. And so, in many cases, have stepped-up money-raising campaigns by alumni groups and cooperative regional and state groups of colleges.

Still a Long Way to Go

However, faculty salaries started their ascent from such a dismal depth that they still have a long, long way to go up before there is room for the comfortable conviction that they are fair, or even safe, from the standpoint of protecting the nation's vital interests. It still remains possible to find many shocking companion pieces for the following incident recently reported to a McGraw-Hill executive group, working on problems of financial aid to higher education, by the president of an illustrious small liberal arts college.

"The recruiting officer of one of our large industrial companies came to our campus a few weeks ago," the college president said, "and offered five of our seniors higher salaries to start working for that company when they are graduated next June than the salary received by any member of our faculty. And the seniors, of course, promptly went to their professors to seek advice on whether or not they should accept. It doesn't take much imagination to see what this sort of thing does to the morale of a faculty."

Senior Teachers Fare Badly

One of the more devastating things it does, of course, is to make the more experienced college and university faculty members receptive to the idea of going to greener pastures, currency-wise, in business and industry.

For these senior faculty members the financial pounding in the past 16 years has been even worse than the chart indicates. While the average real salary gain reported by the chart has been 12%, the average salary of a full professor still buys less than it did in 1940. This is because most of the salary increases have gone to beginning instructors, for whose services industry has been providing the sort of competition reported by the liberal arts college president.

And it creates this financial lackluster of posts as senior college faculty members right at the time their services are needed more than ever to handle the oncoming flood of college and university students. Between now and 1970 college and university enrollment is expected to double.

What is Needed Now

What is clearly needed is a continuation and intensification of the drive to increase their salaries to a point where college and university faculty members will be sharing somewhere near fully in the general prosperity of the nation. It could be counted good progress in this direction if over the next two years faculty salaries on the average were to go up another 12%, with most of the increase concentrated in the senior faculty ranks. And this can be made possible only through more outside contributions.

There is reason to be encouraged by the progress that has been made over the past two years in bailing college and university faculty members out of the terrible financial hole into which they were allowed to slide. But there is the most urgent occasion to keep at it and harder.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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Donald C McGraw

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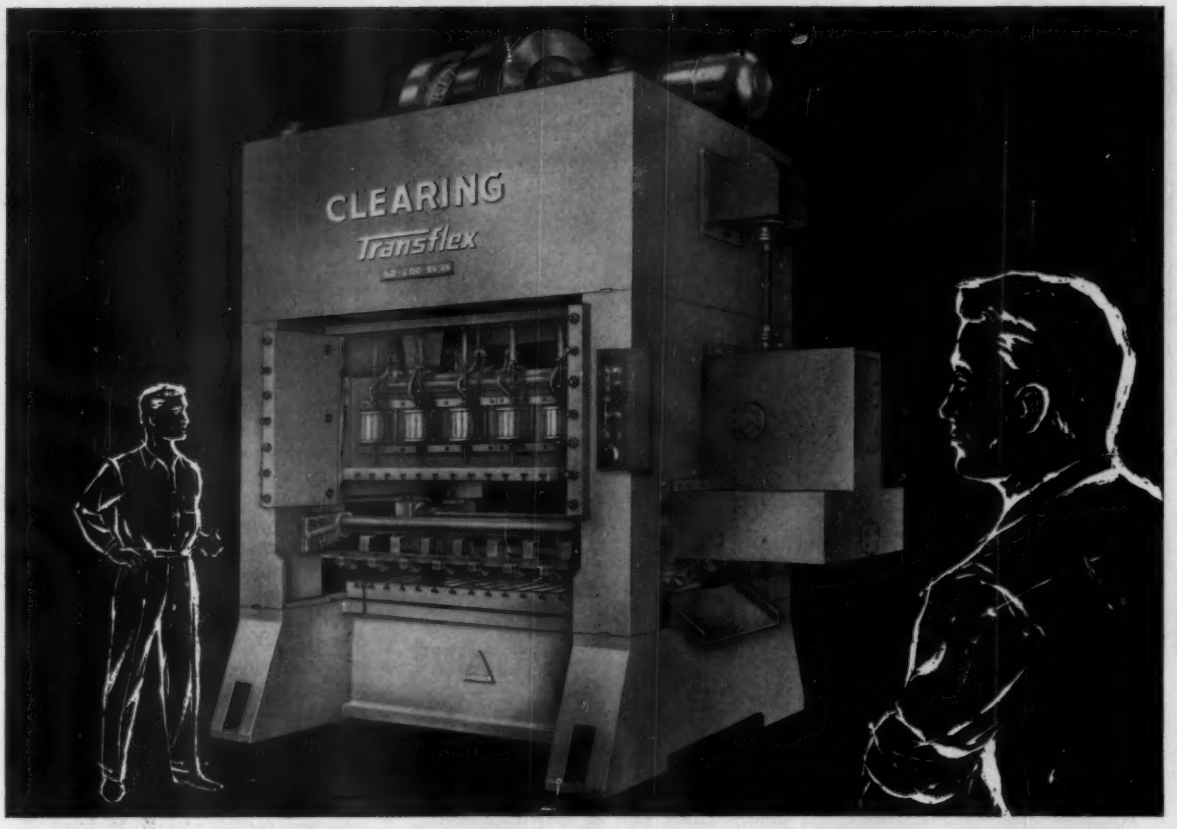
company to run a free legal service. I know of one organization who provides such a service and it is appreciated greatly by those who use it. The lawyer is a full-time employee who is supposed to watch over the day-to-day activities of the firm, in the matter of contracts and the like. The lawyer is also available for consultation by any employee who wants advice in some form or another. The company lawyer will not litigate, except to write letters on behalf of an employee. Some of the problems handled by the company lawyer comprise advice about house purchase and mortgages; automobile laws; old-age pensions; trouble with the neighbors, and the like. I know for a fact that some employees who had been walking around in a cloud of worry had it dispelled after a five-minute chat with the lawyer, and it did not cost them a penny.

In the absence of a free lawyer, the personnel department should always be open to help any employee who has a problem not directly connected with his work. In Britain, the personnel department is expected to take on anything concerning human relations. I notice in most of the Round Table problems which arise, Personnel is referred to as a bureau for the hiring and firing of labor. I don't think that this is the sum total of their activities at all and if they confine themselves solely to buying labor, then I think they should change their title to employment office.

A good personnel department should be prepared to help in housing and lodging, give advice about education, advise about the intricacies of income tax, and any-

"The sharp shooter and the dancer . . ."



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A press like the one above can provide your plant with press automation *plus flexibility* of production at a cost that heretofore would have been considered impossible. We have a great deal of information on Transflex available. It's yours for the asking.

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thing else that concerns the welfare and happiness of employees.

Clifford T Bower
London, England

There are times when the foreman's lot is not a happy one, and Al seems to have struck one of those instances and one of those individuals who seems to think that the foreman's duties do not end with the routine tasks of running his department. Every department has this type of pest, who will attempt to unload his private worries—usually of his own making—on the doorstep of any foreman who is fool enough to listen to him.

One instance of this came to my attention when I heard of a foreman who was awakened at 3 AM by one of his employees calling from the local police station, where he had been taken on a charge of drunken driving. Obviously, still under the influence, this individual was loudly demanding that the foreman come down and arrange bail for him. He was told quietly and firmly that, so far as the foreman was concerned, the police could lock him up and throw away the key, as any man who was foolish enough to drive under the influence deserved all that was coming to him.

As far as the board incident is concerned, Al has every right to tell off the guy who made the unfortunate purchase of the "sour" automobile. But it might be wise for the company to disclaim responsibility for any deals made through the medium of the shop bulletin board—if they have not already done so.

The foreman who tries to enact the role of a good fellow and lend a too sympathetic ear to every half-baked tale of woe is due for more than his share of headaches.

Robert S Alexander
Glastonbury, Conn

"We people in the office thought we'd get together and buy you a gift, boss."

New Books

THIN FILMS OF POLYTETRAFLUOROETHYLENE RESIN (TEFLON) AS LUBRICANTS AND PRESERVATIVE COATINGS FOR METALS—*By V G Fitz-Simmons and W A Zisman. Published by Office of Technical Services, US Dept of Commerce, Washington 25, DC. Report No PB 121161. 32 pages. Price $1.00.*

Successful use of Teflon by the Navy for lubricating and preserving a wide variety of equipment indicates that this material, when applied as a thin film to hard substances, will produce a dry, chemically resistant, all-weather lubricant. The Naval Research Laboratory describes its preservative qualities as remarkable, but it is pointed out that it is not a panacea for solving all lubricating problems without the use of oils and greases. Information is given on the techniques developed by NRL to insure minimum friction, maximum durability, good adhesion, and good corrosion prevention.

•

CODETERMINATION IN THE GERMAN STEEL INDUSTRY—*By W Michael Blumenthal. Published by Industrial Relations Section, Dept of Economics & Sociology, Princeton University, Princeton, NJ. 116 pages, 6 x 9¼. Paper bound. Price $3.00.*

Although the recent codetermination law in Germany appears to be a direct approach to socialism in that it requires labor to be given equal representation with the owners of the industry on the board of supervision, with equal status, authority, and pay, yet no real difficulties have been encountered. It was at first assumed that either private capital would be scared away, costs would rise, and productivity would drop, or that the labor representatives would be corrupted by the high salaries and managerial privileges and thus become "management men."

This carefully prepared report, however, disregards what might have been and deals objectively with the actual experience of codetermination in the steel industry. It is the first such study to be made by Princeton of managerial and labor

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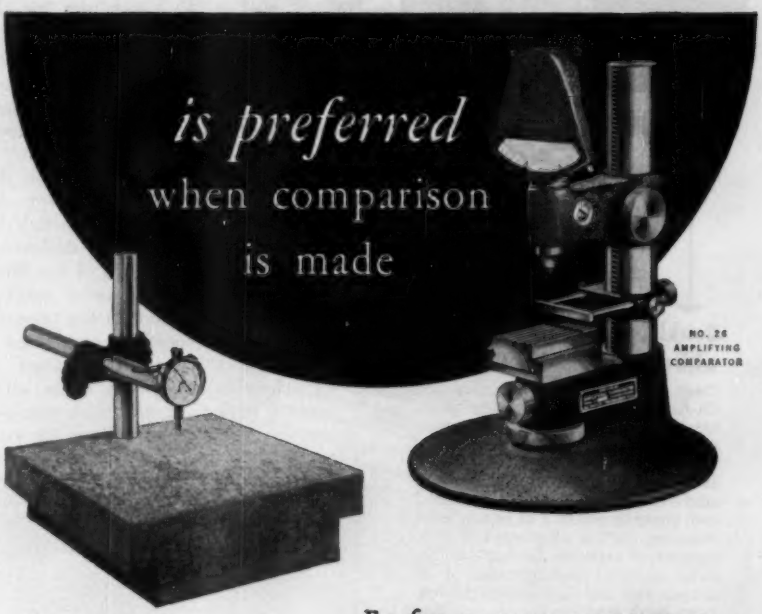

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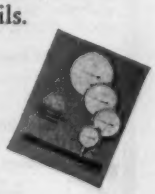

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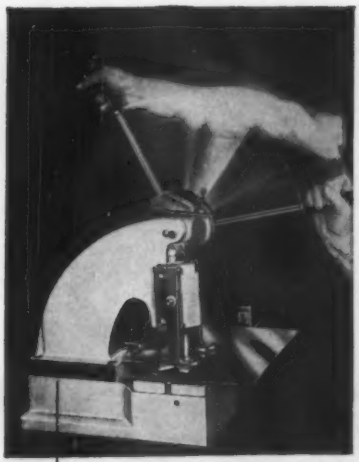

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problems in a foreign country, but there will probably be others in future years. Such studies will help Americans to understand labor problems abroad and provide fresh perspectives for understanding trends in domestic industrial relations.

•

REACTOR SHIELDING DESIGN MANUAL —*By T Rockwell III, Naval Reactors Branch, AEC. Published by Office of Technical Services, US Dept of Commerce, Washington 25, DC. 478 pages. Price $2.10. Order as TID-7004.*

Step-by-step instructions for designing reactor shielding are described in this new manual which details procedures used in designing, construction, and testing of the Shippingport pressurized water reactor. Material is presented in the progressive phases necessary to design a shield on a basic, rather than an experimental approach, thus eliminating expensive and time consuming use of reactor facilities for full-scale mock-ups.

•

TOOL DESIGN. SECOND EDITION. *By Cyril Donaldson and George H Le Cain, Mechanical Dept, Rochester Institute of Technology. Published by the McGraw-Hill Book Co, 330 W 42nd St, New York 36, NY. 557 6x9-in. pages. Price $6.75.*

This book is more than an elementary text on tool design principles. The authors give the students a brief introduction to the economics of manufacturing, estimating production costs, the selection of machine tools, and writing up an operation sheet. Tool drafting procedures and manufacturing processes are covered in subsequent chapters.

Before moving into design of cutting tools and press tools, the student is given an understanding of the properties of materials and how tolerances and allowances are applied, plus a rather extensive chapter on welding. In many ways, the section on cutting tools is primarily machining practice, not tool design, but does serve to acquaint the student with single-point tools, tool angles, milling cutters, etc.

The best chapters in the book are those related to tools for Brown & Sharpe screw machines and cam design.

On the whole, the book is a good elementary text on a wide range of subject matter. It is felt, however, that the authors have attempted too broad a coverage for the student to develop much competence in any one phase, unless supplemented by other books or lecture courses.

•

A REVIEW OF THE AIR FORCE MATERIALS RESEARCH AND DEVELOPMENT PROGRAM—*By Mary M Sokas, Wright Air Development Center. Published by Office of Technical Services, US Dept of Commerce, Washington 25, DC. 137 pages. Price $3.50. Order as PB 111648S.*

Two hundred and five research reports are abstracted in this new publication covering the period from July 1, 1954 to June 30, 1955. Reports concern adhesives, metallurgy, analysis and measurement, petroleum products, plastics, packaging, protective treatments, and rubber. Two earlier volumes, PB 111648, price $2.75, and PB 111537, price $3.75, cover respectively the periods from July 1, 1953 to June 30, 1954, and the ten years of research prior to July 1, 1953.

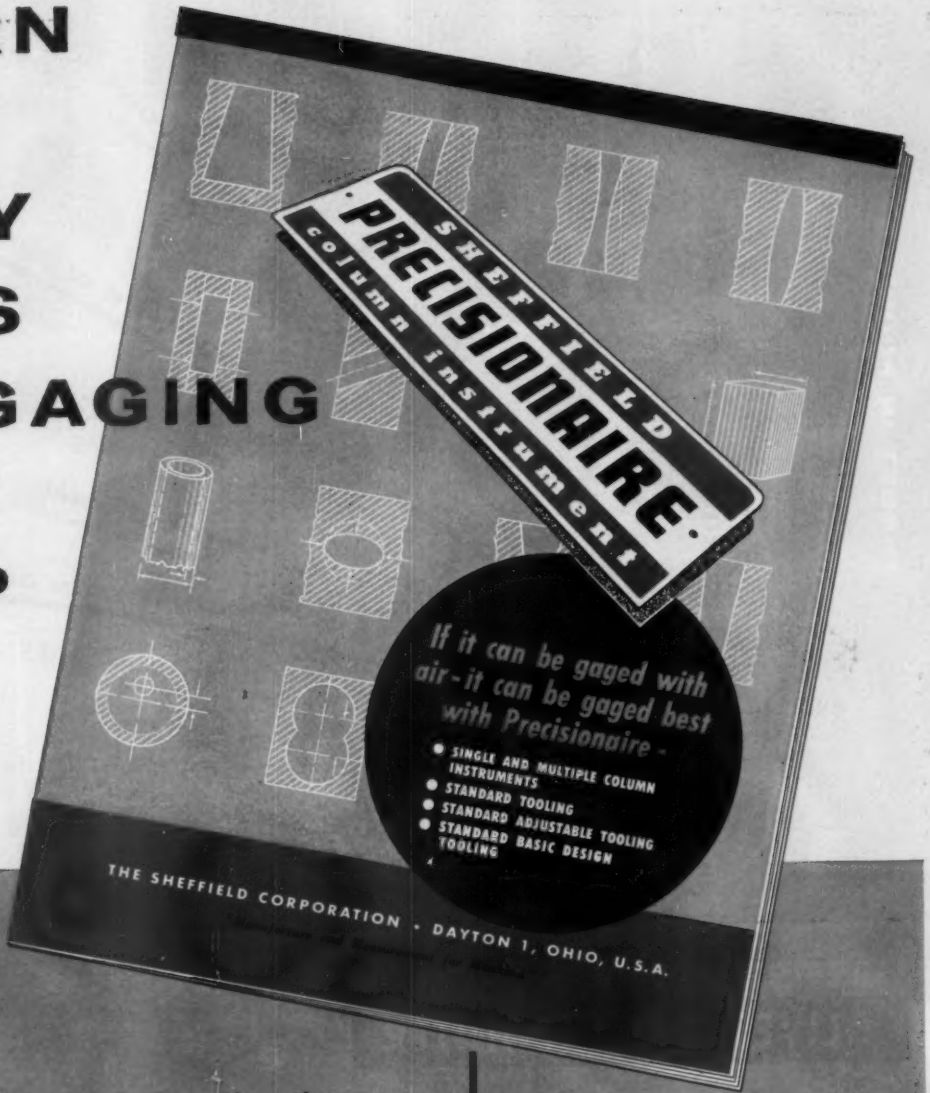
•

FUNDAMENTALS OF BRAZING—*By N Bredzs and O T Barnett, Armour Research Foundation. Published by Office of Technical Services, US Dept of Commerce, Washington 25, DC. 162 pages. Price $4.25. Order as PB 111697.*

Two fundamental investigations are described in this report. One concerns causes and elimination of imperfections in brazed joints, with specific study of wetability. A new phenomenon was observed which demonstrated the influence of oxygen through layers of molten pure and alloy-based silver on the wetability of steel. Tests indicate possibilities for development of self-fluxing, air-proof brazing alloys. The

(Continued on page 248)

LEARN THE MANY WAYS AIR GAGING CAN HELP YOU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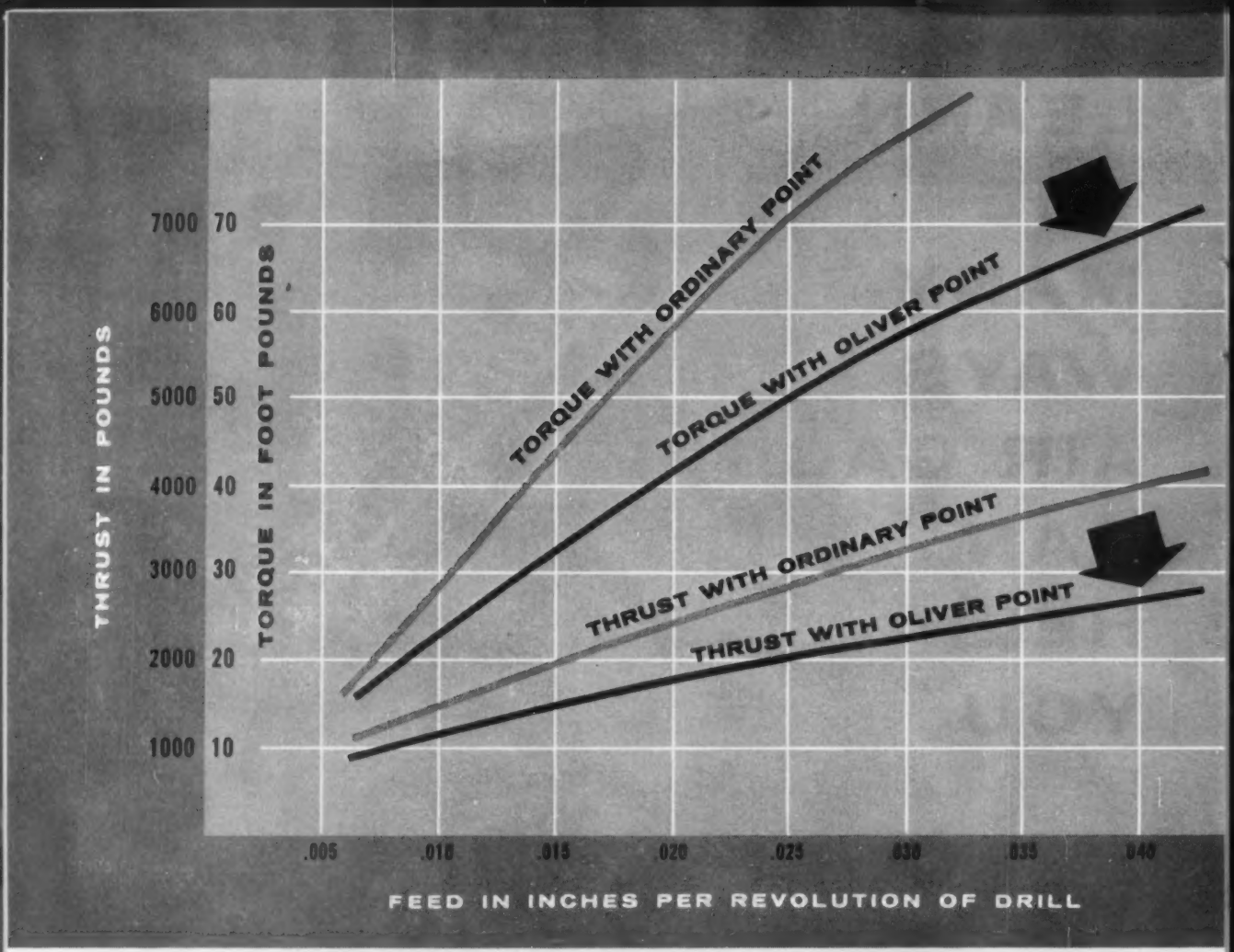

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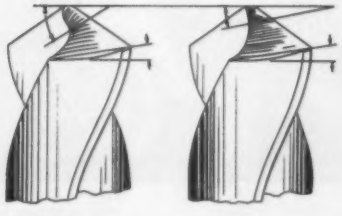

The drill point on the right is one as ordinarily ground. On the left is an exaggerated view of an Oliver drill point. Note that the clearance angle on the point increases very rapidly as the drill web is approached.

Substantially less torque—much less thrust!

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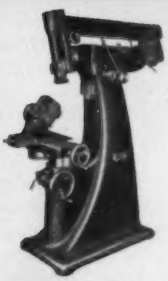
More **OLIVER** *of* **ADRIAN** *Tool Grinding Equipment*

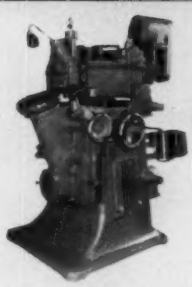


"ACE" TOOL-CUTTER GRINDER

Universal—grinds wide range of milling cutters and other cutting tools. Especially suited to grinding tungsten carbide.

DIE MAKING MACHINE

Built to produce dies, gages, cams, templates, stripper plates, etc. at greatly reduced costs. Five designs in two types.



FACE MILL GRINDER

The only completely automatic grinder on the market. A machine tool designed for accurate grinding.

TEMPLATE TOOL BIT GRINDER

Controlled form grinding for high speed, stellite and tungsten carbide single point tools.

Just check the coupon for literature on the OLIVER of ADRIAN machine you are interested in. Send it today to . . .

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OLIVER INSTRUMENT COMPANY

1414 E. Maumee St. • Adrian, Michigan

- ☐ Drill Pointer
- ☐ Face Mill Grinder
- ☐ "Ace" Universal Tool and Cutter Grinder
- ☐ Die Making Machine
- ☐ Drill Point Thinner
- ☐ Template Tool Bit Grinder

NAME_____

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Increase cutting life up to 30%...with DISSTON SEGMENTAL CIRCULAR SAWS!

Exclusive pin-lock feature *locks* segments together by aligning pins—permanently holding the segments in perfect alignment. Since there are no aligning rivets to limit sharpening, up to 30% more cutting life is possible.

DISSTON
U.S.A.
A
1
2
Exclusive pin-lock feature (A) eliminates aligning rivets generally used in segmental saws. Saws with aligning rivets can only be sharpened down to line 1. Disston Segmental Saws can be sharpened down to line 2, giving up to 30% more cutting life.

- **Replaceable high-speed steel segments need only infrequent sharpening.**
- **Narrow kerf assures fast, clean cutting with minimum waste.**
- **Teeth are accurately indexed so they may be sharpened on automatic machines.**
- **For cutting ferrous or non-ferrous metals.**
- **In diameters from 11" to 63".**

For cutting non-ferrous metals and plastics Disston also manufactures a complete line of solid tooth Diss-croloy and Alloy Circular Saws.

For new literature write to Disston-HKP, Philadelphia 35, Pa.

HKP Henry DISSTON DIVISION
H. K. PORTER COMPANY, INC.

second study dealt with tensile strength-joint thickness curves. Investigation with silver showed that, in extremely thin joints, the fracture strength of the filler metal can enter the region of brittle fracture. Investigation of extremely thin copper-brazed joints led to development of a new brazing method involving diffusion of the filler metal into adjacent layers of the base metal.

•

ELECTROLYTIC GRINDING OF HARD METALS AND CARBIDES—*By I Weber, Frankford Arsenal. Published by Office of Technical Services, US Dept of Commerce, Washington 25, DC. 42 pages. Price $1.25. Order as PB 111834.*

Electrolytic grinding was investigated as a substitute for diamond grinding of carbide and hard metals. Suitable electrolytes and the various parameters affecting grinding rate were studied. Sodium silicate was found necessary to produce sharp edges. For rapid stock removal, high-conductivity electrolytes such as sodium nitrate were far superior to sodium silicate but produced severe edge erosion.

•

OFFICE OF NAVAL RESEARCH HIGH TEMPERATURE PROJECT, FINAL REPORT—*By J B Conway and A V Grosse. Published by Office of Technical Services, US Dept of Commerce, Washington 25, DC. 65 pages. Price $1.75. Order as PB 121024.*

Five years of research into new methods for production and maintenance of extremely high temperatures in special furnaces are summarized in this report. Studies include ignition temperatures and burning characteristics of metals, centrifugal reactors, combustion at high and low pressures, combustion of fluorine, metal vapors, liquid metals and metal powders, and thermodynamics of metal-oxygen systems.

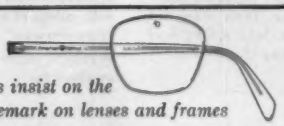
In the combustion of gases, hydrogen-fluorine and cyanogen-oxygen torches were examined. A detailed report is also given on the combustion of zirconium powder and of a cyanogen and oxygen flame under pressure.

PROTECTING EYES...PROMOTING SAFETY

is a Full Time Job at PRATT & WHITNEY!

Recently Pratt & Whitney Aircraft, East Hartford, Connecticut enrolled the 100th member of its Wise Owl Club. These are workers whose eyes have been saved from damage by safety glasses. One of the nation's foremost producers of aircraft engines, the company has a large and active health and safety program and has been participating in the Wise Owl Club for many years.

American Optical Company has worked closely with Pratt & Whitney over the years in striving for the highest possible plant safety standards. *The right safety glasses for the man and the job* is the keynote of a sound eye protection program whether you are in metalworking, chemical or other industry where eye accidents can be a costly problem. Write for literature or ask an American Optical Safety Representative to call.



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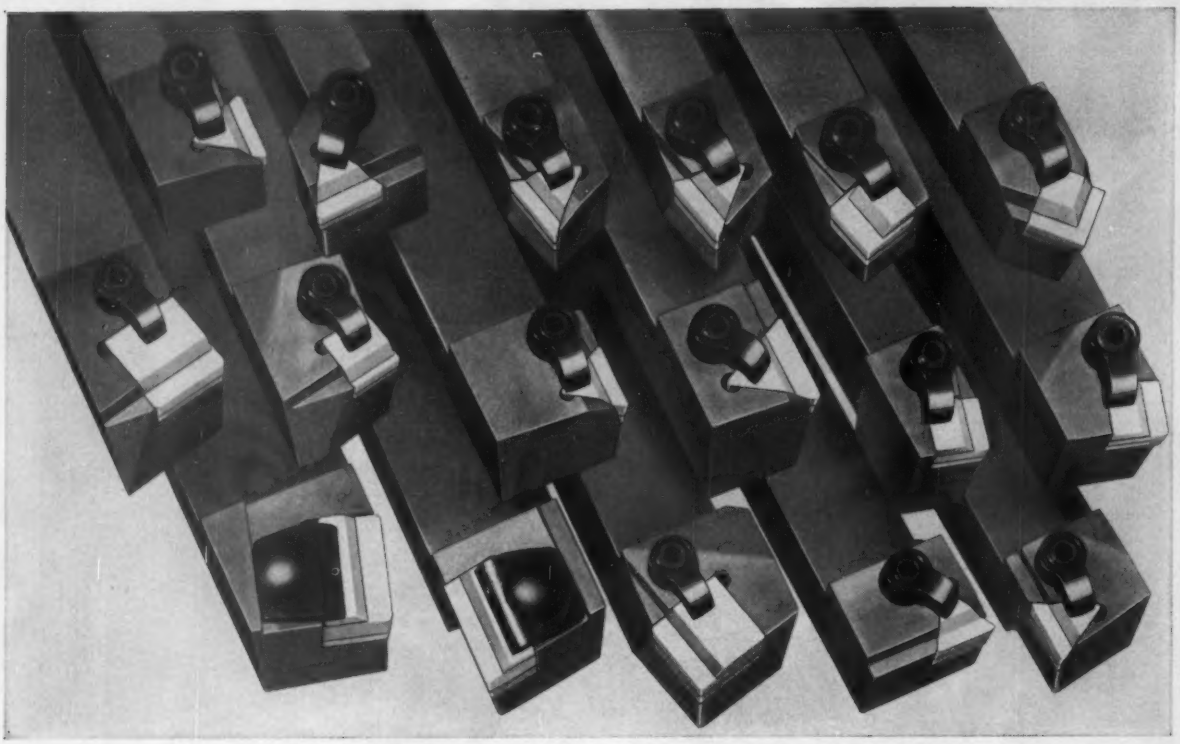


KENNAMETAL*—KENDEX*... the leader in "throw-away" insert tooling

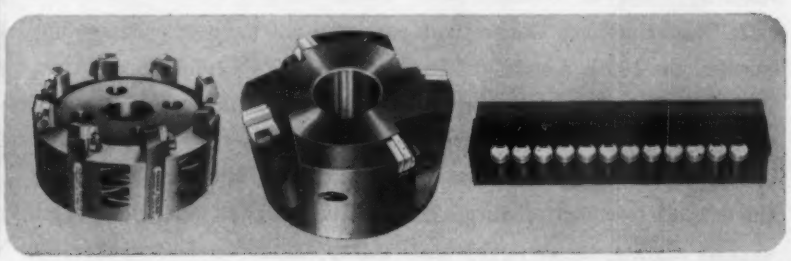
Starting with only six styles several years ago, the Kendex* line of clamped "throw-away" insert type tooling has grown to 27 styles and over 200 tools . . . plus many special designs as illustrated on these pages.

This rapid acceptance of the Kendex principle for more and more machining operations can mean only one thing: Kendex Tooling offers users certain exclusive advantages and a better return on their investment than any other metal-cutting tools available.

Today there are Kendex Tools for practically any metal-cutting operation . . . for use on all types of machines: turret lathes, engine lathes, planers, milling machines and automatic cycling machines. You can have positive or negative rake tools and regular or precision inserts of the right size, shape and grade for top performance on every job . . . for roughing, finishing or interrupted cutting. Every Kendex Tool permits fast indexing of inserts or change of chipbreaker without resetting the tool . . . *eliminates regrinding of inserts and chipbreakers* . . . permits use of harder grades of carbides for higher speeds . . . plus these additional features:

- a wide variety of "throw-away" inserts . . . utility ground (top and bottom) or precision ground (all

Boring bar equipped with standard Kendex indexable inserts (square or triangular), chipbreakers, and insert seats.



Eight standard Kendex Tools adapted for face milling and deep chamfering.

Special 4-insert boring head with adaptation of standard "throw-away" inserts, chipbreakers, shims, and clamp mechanism.

Kendex multiple grooving tool, with 12 turnover inserts. Cutting edges easily indexed—solid Kennametal seats.

surfaces) . . . in round, square or triangular shapes . . . available in eight different grades.

- Solid Kennametal seats are standard on all Kendex holders . . . Kennametal chipbreaker plates optional for all styles.

Now Kendex Boring Bars bring all the advantages of the Kendex principle to turret lathe boring operations

Here are some Kendex advantages on boring operations: the cutting point is brought down to the center line of the bar; greater support of the cutting edge is provided; better chip control; higher speeds for better boring results; greater resistance to thermal shock and to edge wear at higher speeds. Cutting inserts index quickly and accurately without resetting tool thus reducing machine downtime. Costly regrinding is eliminated. Production is increased.

New! Small Kendex Tools for light machining . . . boring

Another variation of the popular Kendex Tooling is the small ½" square by 4½" Kendex holder to use small inserts at a 5° negative rake angle. This is available in four styles for all light machining on high production operations—especially boring. These tools are ideal for using the harder and more crater-resistant grades of Kennametal. The smaller inserts help reduce tooling costs.

All advantages of the Kendex principle are provided by the new line of Kendex Roller Turner Tools. These tools provide constant center height, accurate radius control, ease of tool changing, uniform chip control, higher production and lower cost per cutting edge. Solid Kennametal seat is standard . . . chipbreaker optional.

Why not investigate how you may use Kendex Tooling to speed production . . . reduce tool costs. A Kennametal engineer will help you apply Kendex Tools to your operations. He works exclusively with Kennametal Tooling . . . applying and servicing it. Call your nearest Kennametal office or write now to KENNAMETAL INC., Latrobe, Pa.

*Trademarks C-3016

Kendex Boring Bars are available in two styles: (1) bar with 15° lead angle and square insert; (2) bar for turning to a square shoulder with a triangular insert.

½" square Kendex holders for small "throw-away" inserts are available in four styles with Kennametal seats and chipbreakers.

KENDEX ROLLER TURNERS

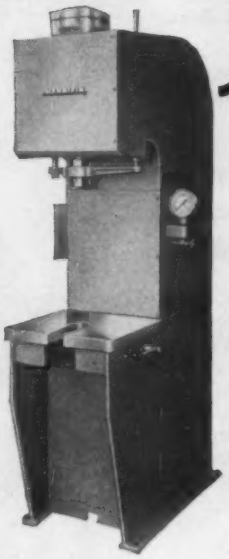
Kendex Roller Turner holders, with shank sizes for standard Warner & Swasey, Gisholt and Jones & Lamson tools.

INDUSTRY AND
KENNAMETAL
. . . Partners in Progress

KENDEX TOOLING PAYS OFF . . . Over and Over

PRICE LIST

ON HANNIFIN STOCK HYDRAULIC PRESSES



1-TON, Bench Type	$ 605
2-TON, Bench Type	$ 680
5-TON, with Base	$1,530
8-TON, with Base	$1,605
10-TON, Floor Type	$2,290
25-TON, Floor Type	$3,790

Prices complete with motors and starters F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

DELIVERY FROM STOCK

Demand for these popular presses is so consistent we are able to produce them in quantity and pass the savings along to you.

Construction-wise and quality-wise these small general-purpose presses are identical to the larger Hannifin presses, up to 150 tons. Special, optional controls when needed.

WRITE for complete information on the Hannifin Hydraulic Press you're interested in.

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with **Tannewitz** HIGH SPEED BAND SAWS

FASTEST, BEST MEANS OF CUTTING METALS

If you are not familiar with the advantages of friction sawing with these machines, by all means drop us a line asking for "Friction Sawing Data." You can save many times the cost of a Tannewitz High Speed Band Saw and greatly expedite production by using it to cut sheets of both hard and soft steel, formed or flat, trimming malleable and steel castings, cutting armor plate or many other materials. Write NOW!

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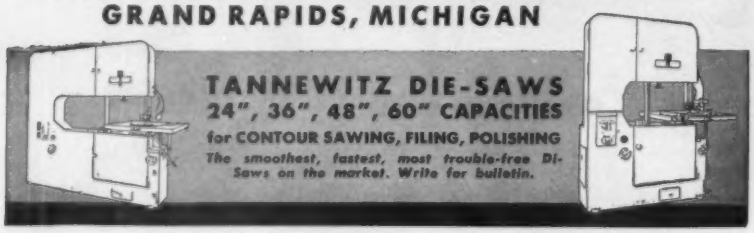

TANNEWITZ DIE-SAWS
24", 36", 48", 60" CAPACITIES
for CONTOUR SAWING, FILING, POLISHING
The smoothest, fastest, most trouble-free Di-Saws on the market. Write for bulletin.

Names in the News . . .

G A Godwin and **Edward L Nung** have been elected vice presidents of P R Mallory & Co, Indianapolis, Ind. Mr Godwin is general manager of the metallurgical divisions; Mr Nung heads the electronic divisions.

J D Kennedy, manager of component sales for General Electric's Metallurgical Products Dept, Detroit, has been named manager of the industrial diamond section. He succeeds **J S Gillespie,** recently appointed manager of engineering.

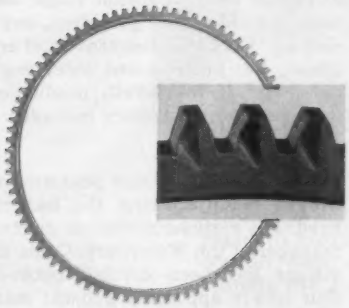
Arthur J Buckley, sales manager of Pangborn Corp, Hagerstown, Md, has been promoted to general sales manager.

Condé Hamlin, president of DeWalt Inc, a subsidiary of American Machine & Foundry Co, has been appointed to the newly-created position of deputy group executive of AMF's General Products Group. He will be responsible for coordinating and supervising operations of DeWalt, AMF Cycle Co, Junior Toy Corp, and BMC Manufacturing Corp, all AMF subsidiaries. Mr Hamlin will continue to serve as DeWalt president. **Edward W Forth,** formerly vice president, manufacturing, of DeWalt, has been named vice president and general manager of AMF Cycle. He replaces **Stanley C Amren** who has resigned.

Ernest M Fuller, works manager of Wyman-Gordon's Worcester plant, has been appointed works manager of the North Grafton, Mass, facility. Additional promotions: **J Robert Doustin,** plant manager, North Grafton, to district sales manager, Los Angeles; **Leo W Ollila,** metallurgical manager, to works manager, Worcester; **Frederick C Esty,** assistant works manager, Worcester, to a similar post at North Grafton; **Herbert K Sampson,** general superintendent, Worcester, to succeed Mr Esty.

S D Den Uyl, president of Bohn Aluminun & Brass Corp, Detroit, has been elected president of the Aluminum Association. Elected as vice presidents: **Russel B Caples,** president, Anaconda Aluminum Co, New York; **W E Dunlap,** president, Aluminum Extrusions, Inc, Charlotte, Mich; and **Frank R Nichols,**

Today's outboards GET GOING with Double Diamond Flywheel Starter Gears



Major makers of electric-starting outboards come to Automotive Gear for their flywheel starter gear requirements. They get our extensive experience in making millions of them for the automotive field—plus skilled engineering aid—plus keen respect for their specifications—plus flame-hardening for better, longer gear performance—plus good delivery.

If you are powering a product, why not talk to the company that specializes in power transmission via gears of many types? An engineer will respond to your inquiry.

EATON

AUTOMOTIVE GEAR DIVISION
MANUFACTURING COMPANY
RICHMOND, INDIANA

GEARS FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS
GEAR-MAKERS TO LEADING MANUFACTURERS

MURRAY WAY "ENGINEERED" JOB #1082

PROBLEM—A special, automatic indexing, polishing set-up for minimum floor space to meet high production schedules with a minimum of service requirement. The equipment to be easily converted to other uses as required.

SOLUTION—

One, standard design, Murray-Way ten station indexing dial-table, with special features.

Eight, universal floating type, Murray-Way polishing heads, with special overhead mounts.

One, special Murray-Way engineered control system.

Ten, Murray-Way designed mounting fixtures.

RESULT—A high production, easily operated polishing set-up with a minimum of occupied floor space. Retractable heads for convenient wheel change. Overhead, head-mounts afford maximum open floor space. Push button controls. A unique, automatic wheel-pressure hunting device. Sturdy dial-table with oversize center-bearing and special anti-friction, hardened rollers for outside support, to reduce wear. Automatic indexing mechanism with continuous motion or adjustable dwell. The entire installation engineered by Murray-Way for easy interchange of fixtures and parts accommodating a wide variety of work.

You too can profit by the combination of Murray-Way's time-tested line of equipment and Murray-Way's specialized engineering. We'll gladly discuss your buffing, grinding and polishing problems.

MURRAY WAY MURRAY-WAY CORPORATION
P. O. BOX 180, MAPLE ROAD EAST · BIRMINGHAM, MICH.
Polishing, Buffing, Grinding, Filtering Equipment that automatically cuts costs.

president, Nichols Wire & Aluminum Co, Davenport, Iowa.

Herbert H Hager has been promoted to general superintendent, steel production, Firth Sterling Inc, Pittsburgh. He was formerly superintendent of production planning in the steel division. **Thomas E Landy,** assistant supervisor of steel production, succeeds Mr Hager.

Samuel N Pritchard has been appointed general sales manager for Henry Disston Division of H K Porter Co, Philadelphia. Prior to joining the company Mr Pritchard was branch manager for IBM in Chester, Penna.

Regal C Meier, assistant to the president of New Process Gear Corp, Syracuse, NY, has been elected vice president of the company.

Melvin L Weinberg has been named vice president, sales and service, of Putnam Tool Co, Detroit. He was formerly sales manager of the company.

Harold C Erskine, general manager of Aluminum Co of America's castings division, has been named assistant general production manager. Duties of **John L Patterson,** general manager of the fabricating division, have been expanded to include managership of the castings division works operations, from now on part of an enlarged fabricating division.

H G Braendel, director of engineering and production at Wilkening Manufacturing Co, Philadelphia maker of Pedrick piston rings, has been appointed vice president, engineering. **J O Lutz,** assistant chief engineer, has been named chief engineer, and **H O Moffett,** production manager, is new factory manager.

Arthur P Hickcox, vice president of Scovill Manufacturing Co, has retired. His responsibilities as general manager of the Waterbury, Conn, divisions has been divided between four newly appointed general managers: **Chauncey P Goss,** Mills Div; **Henry W Wild,** General Manufacturing Div; **Willis H Machin,** Forging and Screw Machine Div; and **Paul E Fenton,** Closure Div.

Kenneth C Butterfield has been appointed staff master mechanic for

GET GREATER GRINDER PRODUCTION BETTER SURFACE FINISHES LOWER PRODUCTION COST

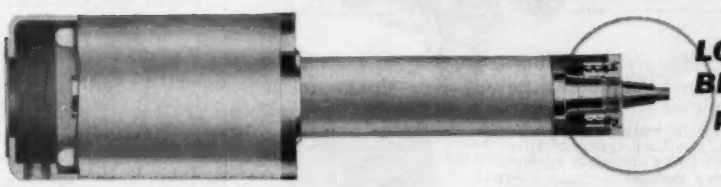
From all your Surface Grinders, new or old

Specify POPE HEAVY DUTY, MOTORIZED SPINDLES

POPE 1, 2 and 3 HP, 1800 or 3600 RPM Surface Grinder Spindles:

- **assure continuous production of accurate parts.**
- **revolve accurately under the heaviest loads.**
- **permanently lubricated (Pope System) for the life of the bearings.**
- **have the rigidity to support diamond wheels and to produce *more good work.***
- **have the extra rigidity for crush dressing and form grinding.**

WRITE FOR PRICE AND DELIVERY.



LOOK AT THE BEARINGS! permanently preloaded

These super-precision, double row cylindrical roller bearings have the capacity to assure smooth, chatter-free operation over a long life — give the Spindle the ability to rough off surplus metal fast but maintain its inbuilt precision for producing fine finishes.

Separate super-precision ball thrust bearings eliminate endwise movement of the shaft in either direction.

No. 117

POPE®

ENGINEERS AND BUILDS STANDARD AND SPECIAL PRECISION ANTI-FRICTION BEARING SPINDLES FOR EVERY PURPOSE

POPE MACHINERY CORPORATION • 261 RIVER STREET • HAVERHILL, MASS.

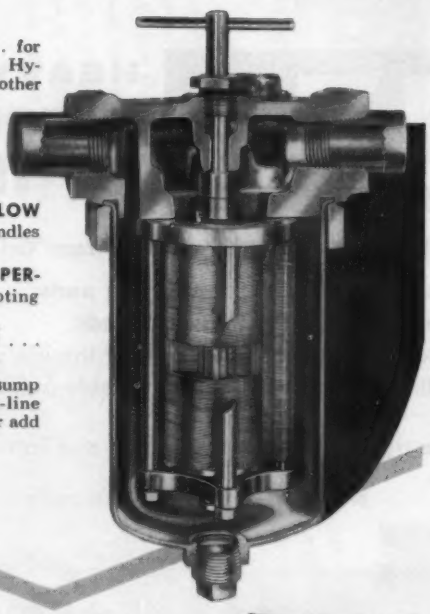
Established 1920

FILTRATION *Engineered** TO MEET METAL WORKING NEEDS

CUNO

a Complete Line of Filters including AUTO-KLEAN and SUPER AUTO-KLEAN

- **POSITIVE PROTECTION** . . . for Coolant Systems, Lube Oils, Hydraulic Fluids, Chemicals and other Process Fluids
- **WIDE FILTRATION RANGE** . . . with spacings from .020" to .0015" (40 microns)
- **SMALL SIZE with HIGH FLOW RATE** . . . unit only 12" high handles over 50 gpm
- **SELF-CLEANING WHILE OPERATING** . . . without interrupting flow
- **ALL-METAL CONSTRUCTION** . . . carbon or stainless steel
- **AVAILABLE** . . . for direct-sump mounting or for separate in-line housing. Easy to build into, or add to, any machine or system.



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WRITE NOW FOR FULLY DESCRIPTIVE PRODUCT LITERATURE . . . *Free Auto-Klean Bulletins will be sent to you by return mail.*

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EDGE-TYPE, WIRE-WOUND, SCREEN, FIBER CARTRIDGE and POROUS METAL FILTERS

Filtration Engineers in Principal Cities

Chrysler Corp. He succeeds **C F Vanderkerck,** named to the general manager's staff of the company's Stamping Division. **Donald H Nelson,** chief tool designer at the Highland Park Manufacturing Plant, has been appointed general master mechanic there, replacing **Raymond Keefer** who has retired.

William F May has been appointed manager of manufacture of American Can Co's Central Division, headquartered in Chicago. He succeeds **R F Dickey,** assigned special duties. Mr May had been manager of the Nonfood Container Division.

R E Brown has been elected president of Hupp Corp's Huppower Division in Detroit. He was formerly general manager.

Raymond M Waggoner has been elected executive vice president of Hubbard & Co, Pittsburgh. He has been serving as vice president and general manager of the company's Pacific Coast operations. **Howard Jackson,** vice president, production, has been named, in addition, general manager of Chicago district manufacturing and sales operations.

E C Phelps has been made works manager of Cooper-Bessemer's Mount Vernon, Ohio, plant; he succeeds **Peter R Letz. Harold C Johnson** has been named manager of manufacturing, and **C W Gilchrist** assistant works manager.

Charles W Stone, executive vice president of Interstate Drop Forge Co, Milwaukee, has been elected president of the company to succeed his father, the late **Charles E Stone.**

Wesson C Miller, assistant sales manager of Parker-Hartford Corp, Hartford, Conn, has been promoted to sales manager.

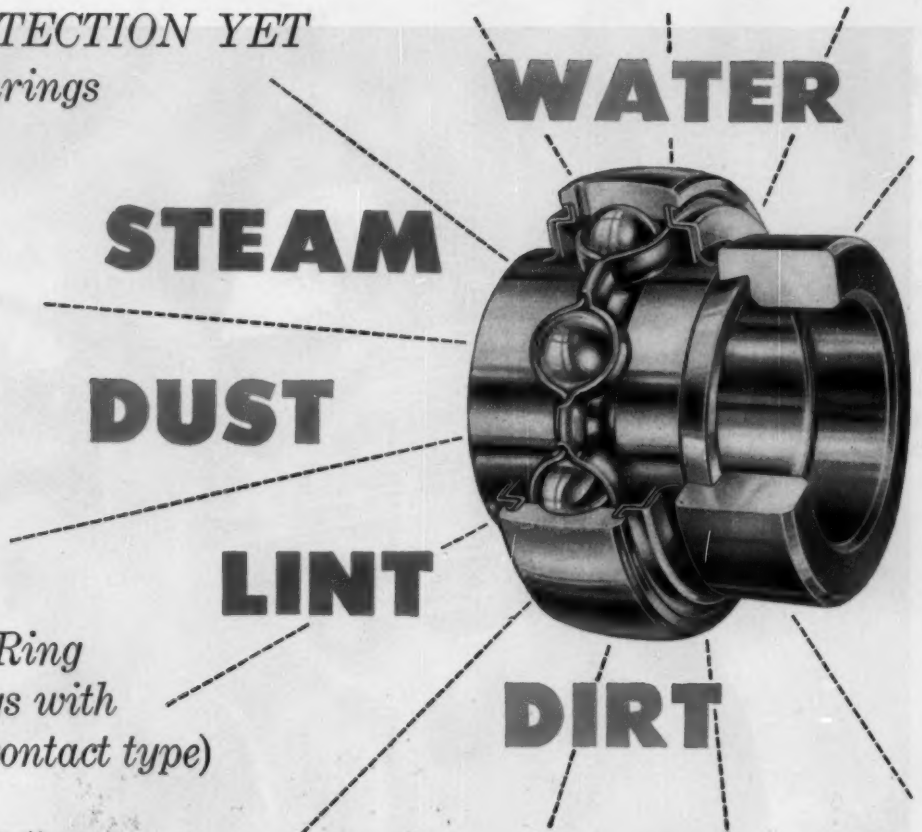
John R Boston has been appointed sales manager of the Claude C Slate Co, Glendale, Calif, developer of the Flotrusion fabricating process for metals. He was formerly associated with the Modgelin Co.

OBITUARIES

Albert C Lindquist, superintendent of the Weldon Tool Co, Cleveland, for many years, died Jan 29.

Joseph F Ross, president of J J Tourek Manufacturing Co, Chicago, died Feb 2.

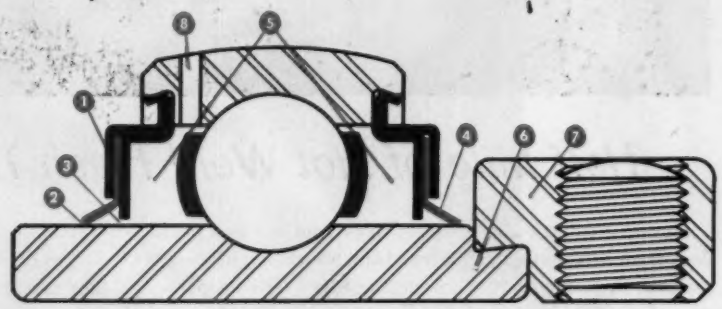
BEST PROTECTION YET
for Ball Bearings
exposed to



FAFNIR
Wide Inner Ring
Ball Bearings with
Plya-Seals (contact type)

FEATURES

1. Plya-Seal of resilient Buna N rubber-coated fabric insuring proper "follow-up" contact
2. Seal rides in firm contact on ground outside diameter of inner ring
3. Close-clearance of inside metal shield with outside diameter of inner ring provides rigid support for seal
4. Flared lip of Plya-Seal won't push in
5. Generous space for lubricant
6. Wide inner ring for extra shaft support
7. Fafnir-originated self-locking, eccentric-cam-design collar
8. Relubricatable



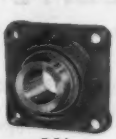
On slow to moderate speed applications where service conditions are subject to excessive contamination, Fafnir Plya-Seal equipped Wide Inner Ring Ball Bearings fill a definite need. Their laboratory and field-tested performance offers the proven protection of contact-type Plya-Seals. They provide every advantage of Fafnir Wide Inner Ring Ball Bearings with Self-Locking Collars . . . ease of application, positive locking, extra large support area on the shaft, relubricatable or nonrelubricatable, self-alignments.

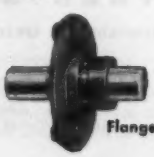
The Plya-Seal as incorporated in the Fafnir Wide Inner Ring Bearing consists of two steel plates between which is sandwiched a synthetic rubber-coated fabric sealing washer. Both steel plates are fixed securely in an outer ring groove. The inner plate provides a rigid backing for the seal and a close-clearance baffle for the retention of grease.

This recent addition to the Fafnir Line is dimensionally interchangeable with the Fafnir Wide Inner Ring Ball Bearings equipped with Mechani-Seals. All types are prelubricated at the factory. Write for descriptive bulletin. The Fafnir Bearing Company, New Britain, Connecticut.

FAFNIR WIDE INNER RING BALL BEARING WITH PLYA-SEALS AVAILABLE IN UNITS BELOW

RAK


RCJ


Flangette

FAFNIR
BALL BEARINGS
MOST COMPLETE LINE IN AMERICA

Half Mile of Hot Weld Flash Trimmed Per Grind

HAYNES STELLITE alloy cutting tools trim red hot weld flash from 3200 automobile wheel blanks without chipping, spalling, or losing their sharp cutting edges. The temperature of the weld is at 1500 deg. F as the tools slice through the flash. During the operation, the tools are subjected to thermal shock as they come in contact with the hot metal . . . and to severe impact as they cut through chilled sections and irregular weld surfaces. Yet they remain in operation for a full 8-hour shift.

Three HAYNES STELLITE alloy tools are used on this job. One rough machines the weld and the following two take finishing cuts. They remove 10½ in. of flash from each wheel blank, and trim a half mile of flash per grind.

HAYNES STELLITE tools remove metal fast. They can be used at high speeds with comparatively high feed rates, and they take deep cuts. They have good impact strength, high compressive strength, and retain their hardness at red heat temperatures. This combination of properties makes them extremely valuable on any machining job.

For information on how HAYNES STELLITE tools can help you speed up your machining operations, write for the booklet "HAYNES STELLITE Metal-Cutting Tools." It gives helpful information on chip formation, tool design, grinding procedures, and the machinability of metals.

"Haynes" and "Haynes Stellite" are registered trade-marks of Union Carbide and Carbon Corporation.

HAYNES TRADE-MARK ALLOYS

HAYNES STELLITE COMPANY

A Division of Union Carbide and Carbon Corporation

UCC

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- 12" SWING
- 1" COLLET CAPACITY
- 1⅝" SPINDLE BORE
- 28" and 35" CENTERS
- VARIABLE SPEED OR DOUBLE V-BELT DRIVE

ACCURACY, CAPACITY AND POWER COMBINED IN THIS 12" LATHE

This 12" swing lathe typifies Logan advanced design and rugged construction. Gears are extra wide and strong. Shafts are extra heavy. The lead screw has a full ⅞" diameter. The precision carriage rides on a two-V-way, two-flat-way bed that is rugged, precision ground and warp-free. The heavy spindle turns on oversize ball bearings, no bearing adjustment needed for any speed between 38 and 1575 rpm. This lathe, and every Logan Lathe from 14" swing down to 9" swing, is dynamically balanced before it is shipped. The result is *sustained accuracy* and smooth, quiet power on every lathe turning operation. See your Logan Lathe dealer for more facts—or mail us the coupon below.

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Variable Speed Drive
35" Centers

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Your gears can be only as accurate as the instruments that test them...

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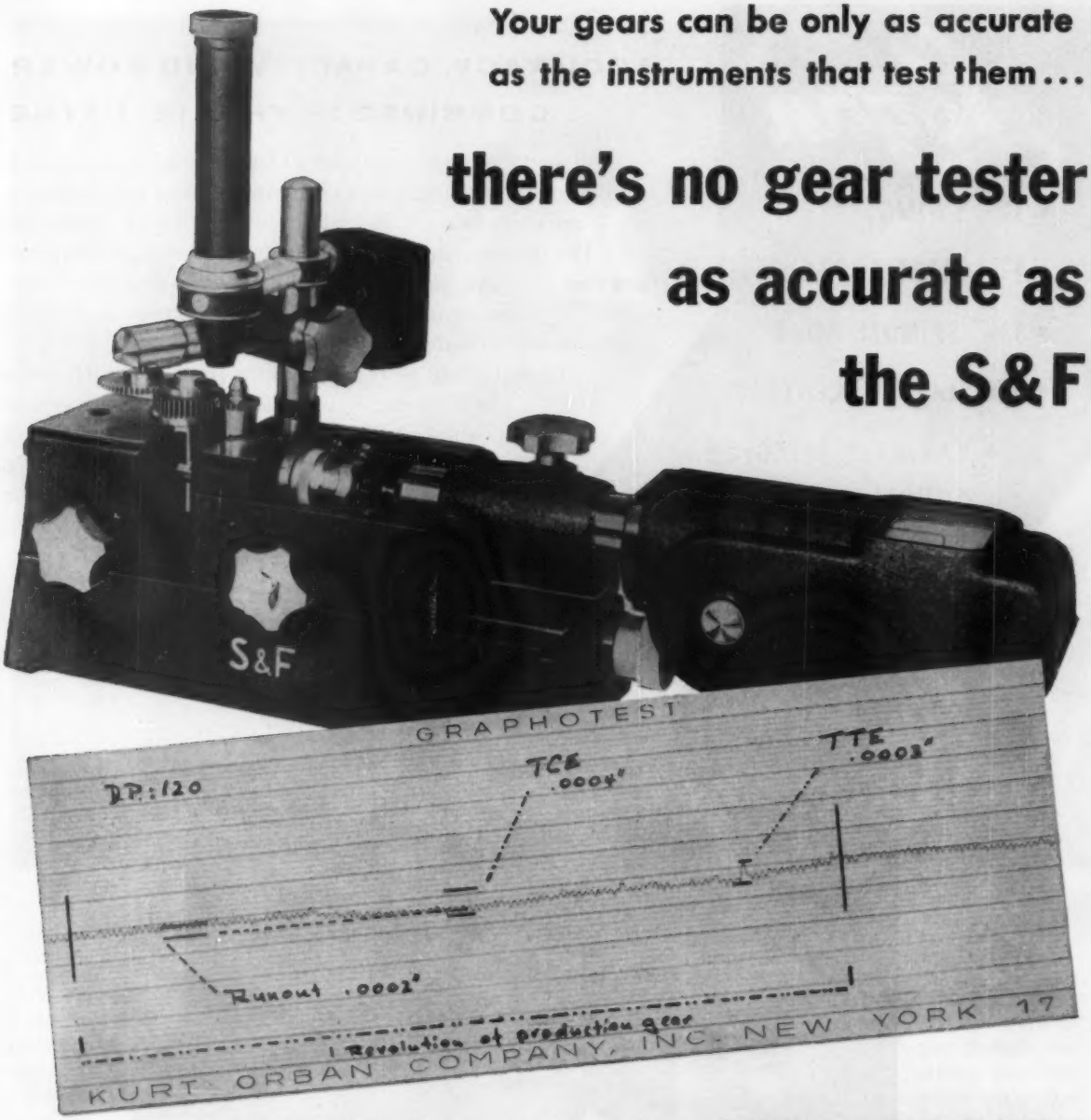

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240 are proving it every day in 168 precision plants that took their gear accuracy seriously enough to change over to the S & F Gear Tester—the fully mechanical instrument that is revolutionizing gear checking.

Want us to prove it to you, too? Ask for a demonstration, or the name of the S & F user near you.

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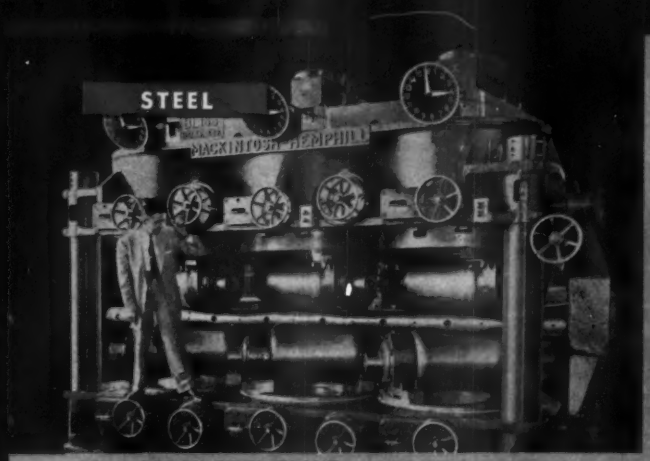
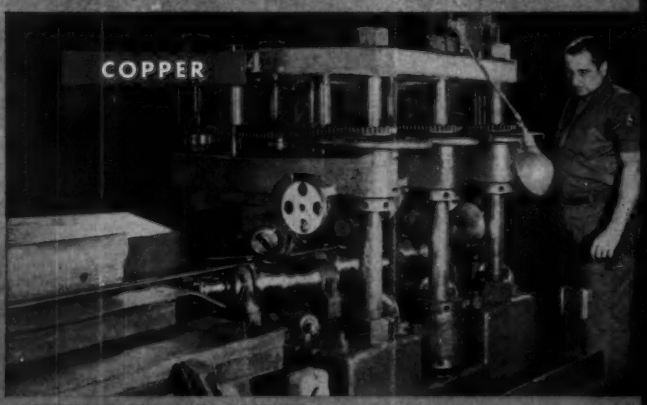


AT A LARGE STEEL PLANT...
This A-5 recently shipped to an eastern steel plant is the largest 6-roll straightener in the world; straightens electric-weld steel pipe in diameters between 4½" and 16", in 16-to-65 foot lengths at speeds up to 240 feet per minute. It illustrates the three-post design now available in large models of the Mack-Hemp straightener.

AT ALCOA...
This Model AX has recently gone into operation at Alcoa's New Kensington, Pa., plant. It straightens from 100 to 150 tons of aluminum alloy tubing every month. Guideless design and power drive to all six rolls enable Mack-Hemp to successfully production-straighten easily-marked aluminum tube.

AT BELL AIRCRAFT...
At this aircraft producer's Buffalo plant, this three-post Model AY straightens 3/16" O.D. 304 Stainless Steel tubing which Bell makes into rocket engine components. The machine raised Bell's straightening capacity from 570 feet to nearly 7500 feet per day...more than *thirteen* times as much!



AT CHASE BRASS & COPPER...
This Model AN, with capacity of ½" to 3" O.D. is one of three Mack-Hemp straighteners at Chase's Cleveland plant. The Models AXY, AX and AN together provide overlapping capacity for 3/16" up to 3" O.D., in straightening brass or copper tube and in "light tempering" annealed copper tube.

For premium tube straightness and roundness at high production speeds...

The MACK-HEMP Guideless Rotary Tube Straightener

- All six rolls driven—no guides—surface of straightened tubing is unmarked.
- Eliminates end bends and ovality; provides premium straightness and roundness over full length of tube.
- Rugged, heavy-duty construction.
- Models for all O.D.'s from 0.050" to 16" of ferrous and non-ferrous pipe and tube.
- Speeds up to 800 feet per minute.
- Easy to reset for different diameters—all models now available in three-post construction. Fast roll adjusting mechanism is enclosed and protected from scale and water.

ALL MODELS ARE NOW AVAILABLE IN MACK-HEMP'S EXCLUSIVE THREE-POST CONSTRUCTION

For complete details on Mack-Hemp Straighteners, write today for a free copy of our 24-page Technical Bulletin No. 55, "How to Straighten Pipe and Tube."

MACKINTOSH-HEMPHILL
DIVISION OF E. W. BLISS COMPANY

MACKINTOSH-HEMPHILL DIVISION · PITTSBURGH · U.S.A. · BLISS

Makers of the rolls with the Striped Red Wabblers

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NEW RELIANCE V★S Jr.

Get fast speed changes over a 30 to 1 range with this all-electric variable speed drive.

The new V★S Jr. gives you instantaneous speed changes, even under load, without belts, pulleys, or gears. This Reliance Drive puts the complete machine operation at the operator's fingertips. All functions, jog, start, stop, reverse and speed changes, are placed in a compact, remote control station.

There's a big power cushion in the motor, too . . . power for smooth speed pick up, even under heavy shock loads, and dynamic braking for fast controlled stops without shuddering or jerking.

The Reliance V★S Jr. is your answer to machinery drive problems in the ¾ to 4 horsepower range. Package construction makes installation easy; just plug it in to a single phase 220 or 440 volt a-c. line.

Write for complete details and prices. (D-1539)

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AND ENGINEERING COMPANY

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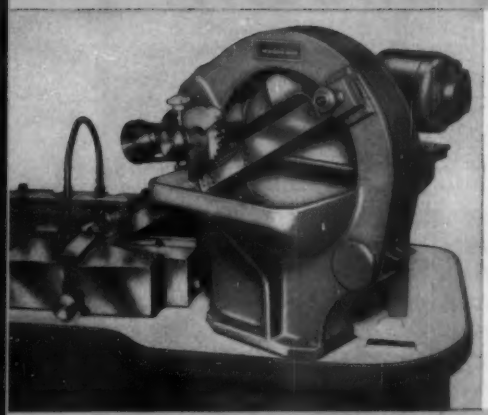
SCREWS or NAILS THREADED

with Hartford Special Automatic Thread Rollers

- **Diameters from .086 to .3125"**
- **Thread lengths from ⅛ to 2½"**
- **Large capacity hopper reduces refill time**
- **Positive positioning and feeding of blanks**
- **Variable bucket speeds**
- **Roll Class 3 Thread Fits**
- **Wired to J.I.C. Standards**



SPECIFICATIONS
MODEL A-190-R

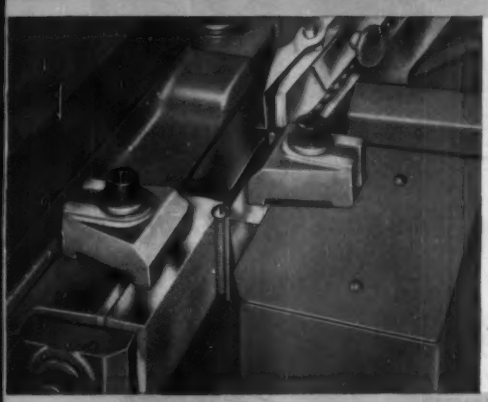
Screw Diameter Capacity: Machine Screw Sizes from #2 (.086) to #10 (.190)

Thread Length Capacity: ⅛" to 1½" with standard depth dies; 2" with special depth dies

Production Rate: 230 to 250 pieces per minute

Machine Dimensions: Length, 42"; Width, 26"; Height to table, 33"; Height overall, 52"

Floor Space Required: 4' x 5' approximately



SPECIFICATIONS
MODEL A-312-H

Screw Diameter Capacity: Machine Screw Size #6 (.138) to 5/16"

Thread Length Capacity: ⅛" to 2" with standard depth dies; 2½" with special depth dies

Production Rate: 80, 100, 120 or 140 pieces per minute dependent on screw size

Machine Dimensions: Length, 62"; Width, 39½"; Table Height, 36"; Overall Height, 63½"; Hopper Loading Height, 53"

Floor Space Required: 4'x6', approximately

Hartford's line of automatic Thread Rollers can accommodate all types of machine screws, sheet metal screws, drive screws, wood screws, nails and screwnails. They will also knurl, burnish or groove, and can handle specials as well.

These high production machines are equipped with a filtered lubrication system. They are vibration-free even at top speed. They are ruggedly designed, and engineered to provide "table-top" working level to reduce operator fatigue.

Write for Bulletin TR-102 for complete information.

Hartford Special also makes Drilling and Tapping Machines, Machine Components, Special Machines and the world famous Super-Spacer.

HARTFORD Special

MACHINE TOOL ACCESSORIES DIVISION

THE HARTFORD SPECIAL MACHINERY CO.

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All TWA Flights Carry Air Mail, Air Express and Air Freight

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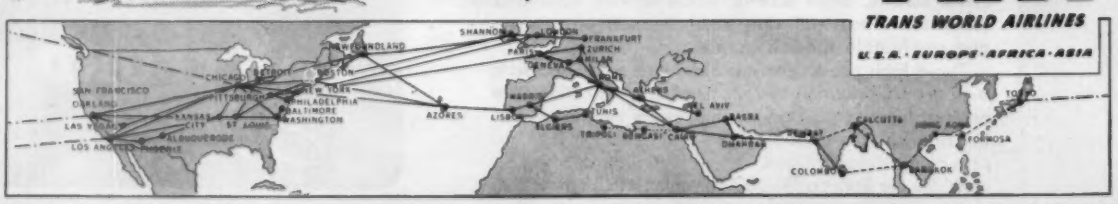
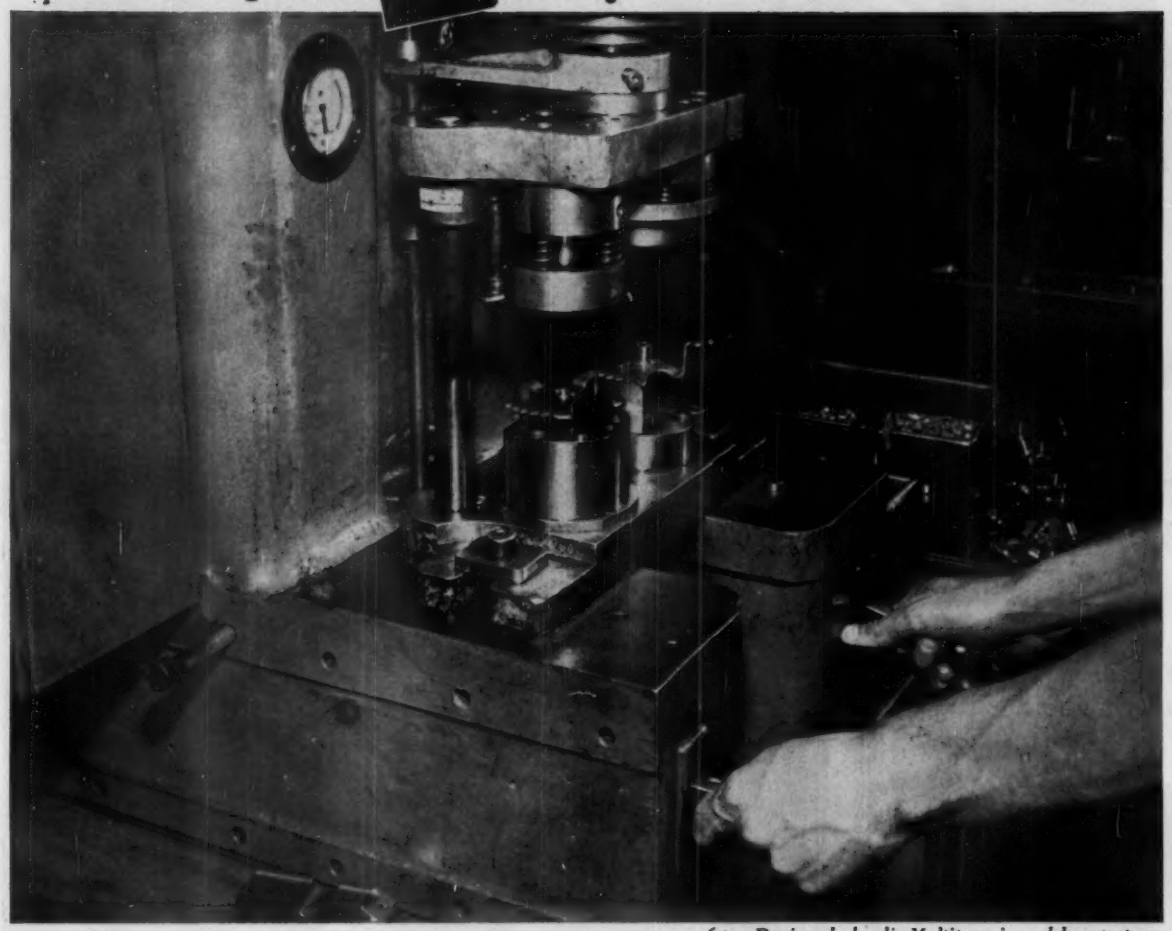


A Multipress case study



6-ton Denison hydraulic Multipress is used here to press valve lever over shaft; then stake lever securely to shaft.

MULTIPRESS® speeds transmission parts assembly at Chrysler

PRECISION assembly operations for automatic torque converter transmission components are performed quickly and economically by small Denison hydraulic presses at the Indianapolis plant of Chrysler Corporation.

While costs have been reduced, the high quality standards essential in a precision product have been maintained. Maximum operator safety is a Multipress bonus.

Let a Denison hydraulic engineer point the way to improvements in your production methods with the versatile Multipress. Write Denison Engineering Division, American Brake Shoe Co., 1164 Dublin Road, Columbus 16, Ohio.

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HYDRAULIC PRESSES • PUMPS • MOTORS • CONTROLS

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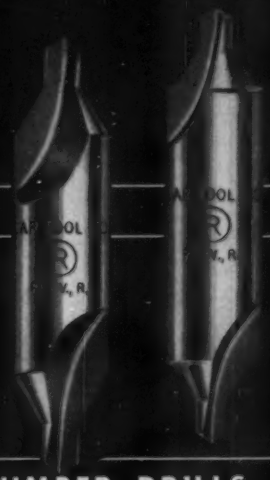
ALL THREE!

OLD STANDARD LETTER DRILLS



NEW STANDARD NUMBER DRILLS

NEW HI-SPIRAL CENTER DRILLS

CIRCLE R center drills include always-popular old standard letter drills, new standard number drills and our new Hi Spiral drills . . . superior for smoother work produced more efficiently; effectiveness assured because chips are cleared more easily.

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Specialists in Circular Cutting Tools Since 1923

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CUT OFF SAWS • CIRCULAR KNIVES & ROTARY SHEAR BLADES • CIRCOLOY STEEL SAWS • SOLID & TIPPED TUNGSTEN CARBIDE SAWS
COMBINED DRILLS & COUNTERSINKS • CENTER REAMERS

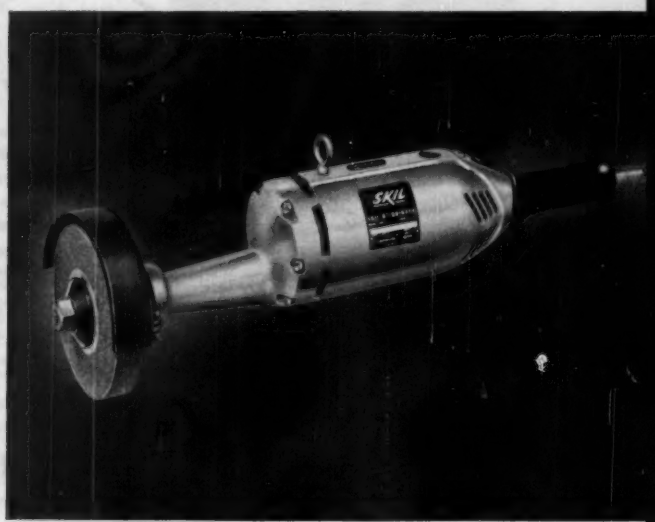
Saves $100 per unit

Griffin Tank and Welding Service of Dallas, Texas, custom builds geographic photographic equipment. This equipment must be light-proof, weatherproof, dustproof and air tight. "When SKIL drivers were substituted for hand tools for fastening, we saved over $100.00 per unit, and quality improved tremendously," says C.B. Jones, Chief Engineer.

Saves one operator

At Mercury Engineering Company, Milwaukee, Wisconsin, two men formerly handled the job above—drilling a 1⅛" hole in 16" steel. Then a SKIL Model 163 was tried. Now, one man not only drills, he also reams, taps and hones. "We always had good experience with all models of SKIL drills," says Ted Curtis of Mercury.

Metalworkers SAVE with SKIL tools



Saves $100 per week

"Our new SKIL Shear paid for itself in the first week," says J.M. McLain, owner of J. M. McLain & Sons Trailer Company, Houston, Texas. "In using other makes of shears we found that maintenance costs were about to run us out of business. Some operations were cut from 30 minutes to 1½ minutes. My men like SKIL shears because they are adaptable and easier to handle."

YOU, TOO, CAN SAVE

With Model 142 you can grind more types of materials than any other grinder. Engineered for the toughest work. No matter what you have to grind, fasten, saw or drill, there's a SKIL tool that can do the job faster, better or cheaper. Let your SKIL distributor show you why. Let him show you the speed, power, versatility and ease of handling of all SKIL power tools.

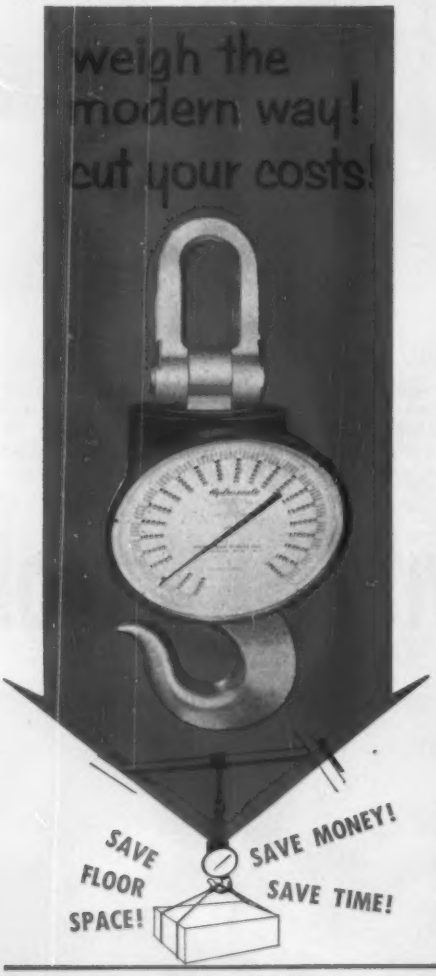
Write SKIL direct for free literature and the name of your nearest distributor.

Made only by SKIL Corporation, 5033 Elston Avenue, Chicago 30, Illinois. In Canada: 3601 Dundas Street West, Toronto 9, Ontario. Factory branches in all leading cities.

SKIL
PORTABLE TOOLS

Use a

®HYDROSCALE ON YOUR CRANE HOOK!



ALL WEIGHING IS DONE ON YOUR CRANE HOOK

You merely hang the HYDROSCALE on the crane hook, or hoist, and leave it there. Then, whenever you lift a load, you'll automatically weigh it, as you lift it. *No extra equipment or plant facilities are required.*

OUTMODES COSTLY CENTRAL WEIGHING STATION

By eliminating the central weighing station, you realize substantial savings in time, floor space and money. And, you provide for automatic weighing at any step in your crane operations, at a fraction of the former cost.

TYPICAL WEIGHING APPLICATIONS

Just a few of the many applications include—loading, unloading, batching, check weighing, foundry charging, production control, process control, checking inventory, and, protecting your equipment from overloading.

COMPLETE LINE OF 110 MODELS NOW AVAILABLE

There's a model to meet most any industrial weighing requirement, and to suit every crane application. Our largest model has a capacity of 200,000 pounds, while our smallest model has a capacity of 500 pounds. They're engineered and built for long service-life, and can be used on any standard crane or hoist.

HYDROSCALES guaranteed

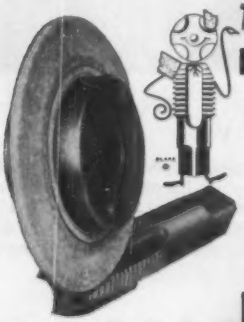
They are guaranteed to be free of defects in workmanship and materials, and to be accurate to ½ of 1% of the maximum dial capacity—

Write for descriptive literature explaining model features.

HYDROWAY SCALES, INC.

31304 Stephenson Highway — Royal Oak, Michigan

"The world's largest producer of crane scales"



To Cut Your Tapping Costs, GRIND and RE-GRIND YOUR TAPS ACCURATELY!

Use these basic hook angles as a starting point for better tapping.

Aluminum	18°	Cast Iron	5°	Brass	5°
Copper	18°	Magnesium	18°	Plastics	8°
Mild Steel	8°	Stainless Steel	12°		

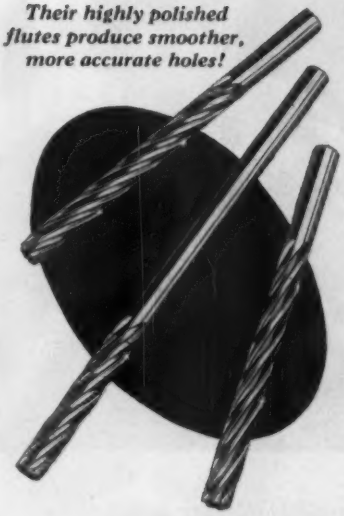
Write for specific details on how the BLAKE Flute and Chamfer Grinders give you the accuracy you need for low tapping costs.

Controlled Grinding of Tap Flutes and Chamfers

EDWARD **BLAKE** COMPANY INC.

435 CHERRY ST., WEST NEWTON 65, MASS

Their highly polished flutes produce smoother, more accurate holes!



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For the finest reamers that money can buy, always specify "ACE"! They're made of top quality, pre-hardened high speed steel and produced by the Ace-originated "ground-from-the-solid" process. Results? Stronger, more highly polished right hand spiral flutes. Keener, longer lasting cutting edges. Plus smoother, more accurate holes at lower cost!

Call your local Ace Drill Distributor today!

NEW CATALOG covers the entire line of Ace "Ground-from-the-Solid" High Speed Steel and Carbide Drills, Reamers, Drill Blanks and Special Drills. Send for it today!

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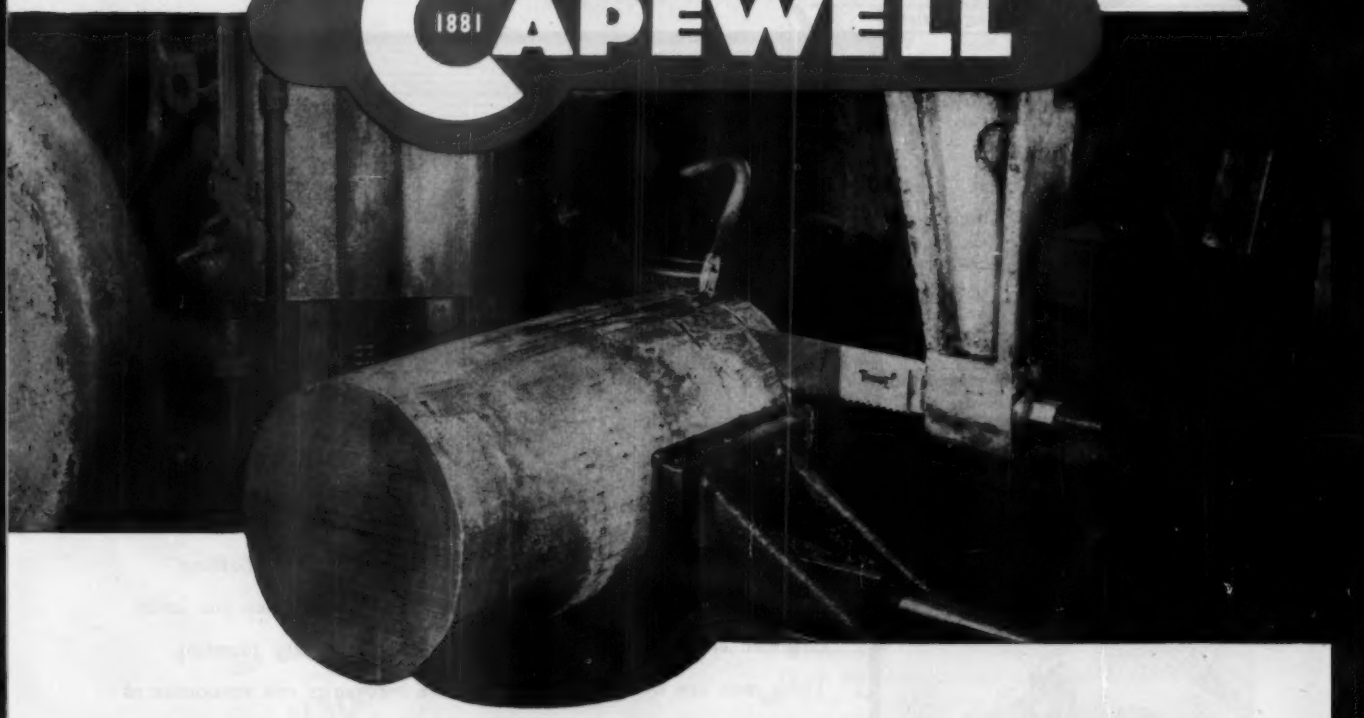
ADRIAN, MICHIGAN

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

cut it with stop

1881 CAPEWELL



power hack saw blades

THE USER: M. W. Kellogg Company's Electric Products Department

THE MATERIAL: Super Alloy Ingots of Kellogg's own manufacture—ASM 5728, 5733, 5735, etc.

THE JOB: Cutting jet aircraft forging steel

THE PROBLEM: Crooked cuts . . . too few cuts per blade

THE ANSWER: Capewell Technite Power Hack Saw Blades

THE RESULT: Accurately perpendicular cuts . . . blade life greatly extended

M. W. Kellogg Company's Electric Products Department chose Capewell's Technite Molybdenum High Speed Blade for this exceedingly tough cutting job because Technite blades completely eliminated sawing difficulties, not only in comparative tests but in continued production use, by providing highly accurate cuts under heavy feeds . . . and with an unusually long blade life.

Other high speed Capewell Power Hack Saw Blades, Safetech and High Speed, are also designed to assure the maximum sawing performance and meet today's accelerated production line requirements.

You, too, can improve your production by standardizing on Capewell Power Hack Saw Blades. Tooth by tooth, you'll find that Capewell blades are a superior product, manufactured to rigid specifications, so that you can be assured of blades that stay sharper longer.

75 CAPEWELL ANNIVERSARY

SOLD ONLY THROUGH

CAPEWELL DISTRIBUTORS

who provide: complete inventory

. . . engineering assistance

. . . delivery when you need it.

THE CAPEWELL MANUFACTURING COMPANY
Hartford 2, Connecticut

Please send complete details on Capewell Power Hack Saw Blades to:

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AMERICAN SOCIETY OF TOOL ENGINEERS
25th ANNIVERSARY
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A BETTER LIFE THROUGH CREATIVE MANUFACTURING

Greenlee salutes the American Society of Tool Engineers on their 25th Anniversary.

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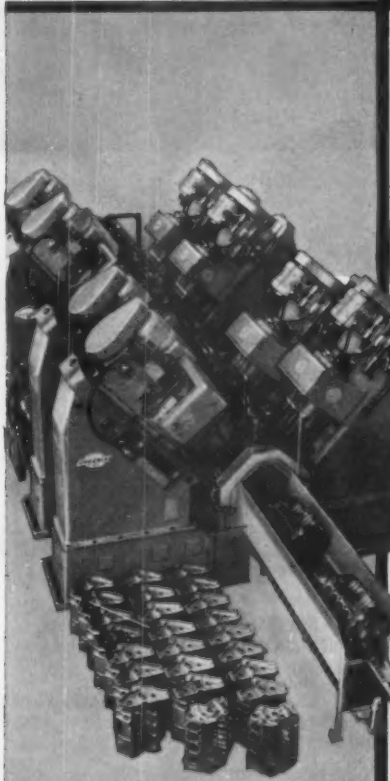
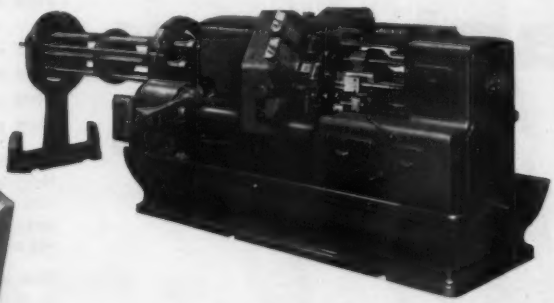


Creative manufacturing begins with creative planning. Baffling problems of production have a way of disappearing when you invite Greenlee engineers to participate in your preliminary planning. These men are well acquainted with the mechanics and economics of mass production. Their thinking is sound . . . creative. It will pay you to investigate. Write or phone for a consultation today.



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- Multiple-Spindle Drilling and Tapping Machines
- Transfer-Type Processing Machines
- Six and Four-Spindle Automatic Bar Machines
- Hydro-Borer Precision Boring Machines

GREENLEE BROS. & CO.

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"A" Grade Working Gage Blocks . . .

at "B" Grade Prices

Set No. 860*
84 pieces
.0001" Series— 9 Blocks .1001" thru .1009"
.001" Series—49 Blocks .101" thru .149"
.050" Series—19 Blocks .050" thru .950"
1.000" Series— 4 Blocks 1.000" thru 4.000"
Quarter tenth Series—3 Blocks .100025", .100050" .100075"

Set No. 380*
36 pieces
.0001" Series—9 Blocks .1001" thru .1009"
.001" Series—9 Blocks .101" thru .109"
.010" Series—9 Blocks .110" thru .190"
.100" Series—5 Blocks .100" thru .500"
1.000" Series—3 Blocks 1.000" 2.000" 4.000"
Half tenth Series—1 Block .10005"

* .050" or .100" steel or carbide wear blocks available at slight extra cost.

NEW DoALL SHOP-BLOCKS

ACCURACY:	+ .000006" − .000002"
FINISH:	0.8 AA or better
FLATNESS:	.000004"
PARALLELISM:	.000004"
HARDNESS:	65 Rc

. . . Superior Accuracy for Shop Measurements

No shop can afford to rely on less than Bureau of Standards A Grade gage block accuracy to maintain adequate Dimensional Control by Today's Standards. This accuracy is possible, practical and *here now*, at a price *any* shop can afford. The new low priced DoALL Shop Blocks are guaranteed equal to Bureau of Standards A Grade specifications.

Check the prices, compare the specifications with any other "working" gage blocks. Nowhere else will you find genuine A Grade blocks priced for shop use.

DoALL SHOP BLOCKS meet the realities of today's precision tolerances required right at the bench, job or machine. They represent DoALL's decision to completely discontinue manufacture of B grade blocks, as inadequate for today's dimensional control needs. They provide working accuracies that will save you valuable time, effort and waste . . . give better control needed for shop measurements.

Your DoALL Store is taking orders now for the new SHOP BLOCKS. Call DoALL today. Learn more about these new gage blocks that insure unprecedented working accuracies at a price unmatched anywhere—only DoALL offers you A Grade SHOP BLOCKS at less than B Grade prices!

Better Blocks for Inspection and Laboratory, Too!

New DoALL blocks for inspection and lab use having surface finish of 0 to 0.09 AA are made in A + and AA grade accuracies. For ultra precision work DoALL offers AAA grade accurate to one millionth of an inch. ASK FOR CATALOG.

Your DoALL Store is headquarters for the best in measuring instruments

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CB-211

Northfield KEYSEATER

Model K-6

The New Northfield Model K-6 Keyseater is designed to cut straight or tapered keyways from ⅛" to 1" wide. Work of any shape and diameter can be clamped to the table and cut, grooved, or slotted.

Well engineered design features assure work of exceptional accuracy. Over 30 years of quality machine design and manufacture guarantee satisfaction.

Northfield FOUNDRY & MACHINE CO.

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REDUCE TAP COSTS UP TO 75%

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Use on any tool and cutter grinder or small surface grinder . . . Guarantees precision sharpening through accurate grinding.

a low cost fixture that sharpens dull taps

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- accurately

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give you | rugged construction
longer operating life

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Operates on standard air line, or your hydraulic line.

COMPACT, RUGGED CLAMP CONSTRUCTION
All-welded bar stock insures strength. All pivot points are bushed with Merriman Broach Fit hardened bushings.

UNIQUE ADAPTER JOINS CYLINDER TO CLAMP
Prevents any deflection in clamp from being transmitted to the cylinder rod—for longer operating life.

CYLINDER IS COMPLETELY NON-CORROSIVE
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FOR SPUR - WORM AND HELICAL & BEVEL GEARS

ABOVE PHOTO SHOWS SET-UP FOR WORM GEARS TO CHECK CENTER DISTANCE, CONTACT OF TEETH, RUNOUT, ETC.
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BETWEEN CENTERS
Scale and Vernier, Base of adjustment, Convenient Features to hold Worm and Shaft on V-Blocks or Bushing.

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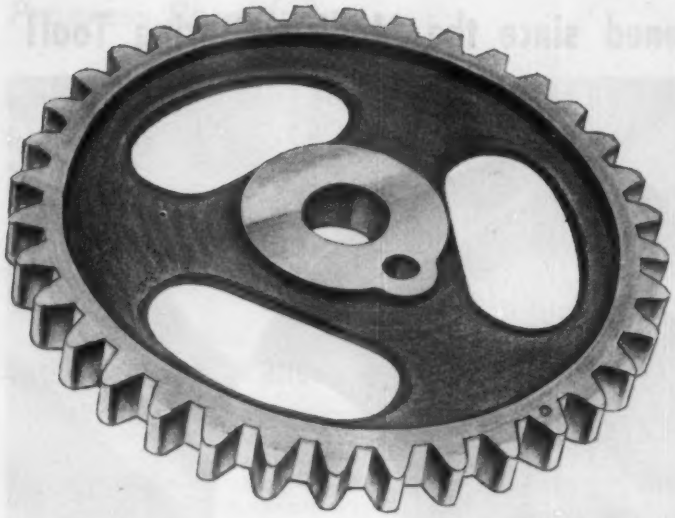
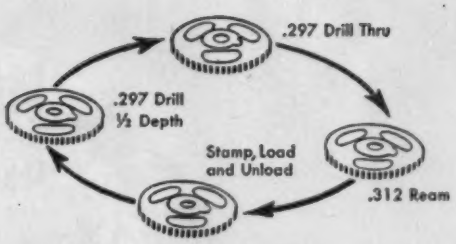
200-AM LAFAYETTE ST. • NEW YORK 12, N.Y.





450 PER HOUR GROSS

- **DRILLED**
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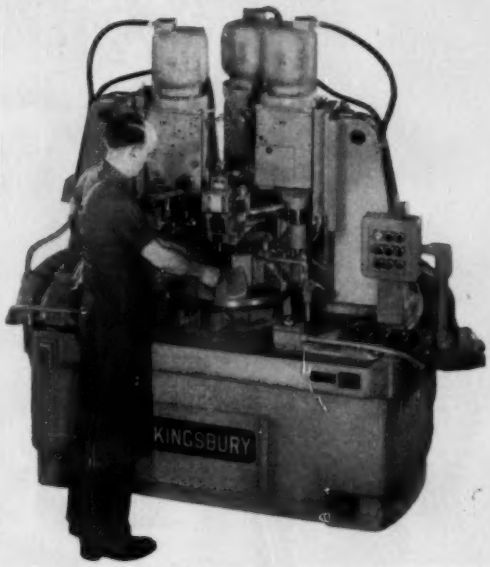
— on this high production

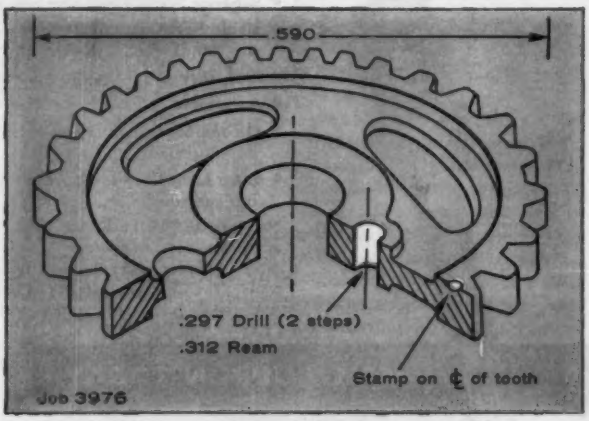
KINGSBURY



This 4-station Kingsbury has a 72" semi-circular base, 20" index table, JIC electrical controls (not shown)

This machine has three single-spindle vertical units, two for drilling and the third for reaming. Drilling in two steps shortens the time cycle, thereby increasing the hourly production. A special mechanism at the operator's station stamps the gear. The operator has only to load the work, push a button, unload completed work. All operations are done automatically at each station.

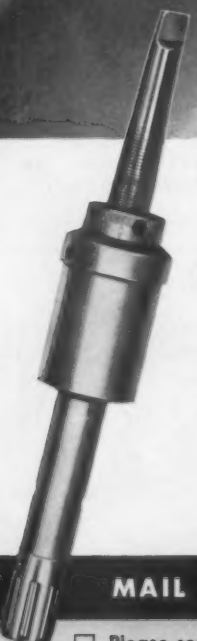
Kingsbury indexing automatics are built for jobs as simple as this one, to complex ones involving a dozen or more drilling, tapping and other operations. In every case, the customer gets a fully tooled machine, ready to produce at the rates he wants. If you have operations like these, we'd like to show you how economically they can be done on a Kingsbury. Kingsbury Machine Tool Corporation, Keene, N. H.



KINGSBURY

INDEXING AUTOMATICS
for high production drilling and tapping

Greatest thing that's happened since the Madison Boring Tool!



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- ***Extra Long Life*** — thousands of passes before parts replacement.

No wonder a customer said it's "the greatest thing since the Madison Boring Tool!" If you'd like to know more about this fabulous tool, or our roller-burnishing tools for O.D. cylindrical surfaces as well as tapers and radii, just send coupon today. Attn: Dept. AM-3

Let the man with the holes in his head tell you how to cut costs in:

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- ★ **Reaming**
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- ★ **Roller-Burnishing**
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Progress Report:

SCHRADER AIR PRODUCTS CAN MAKE PRECISION OPERATIONS EFFICIENT

• Let's clear the air about close tolerances

We've faced it. Lots of manufacturers still think air is as unpredictable as the weather report. But others know better, because they've taken the time to let a little sunlight on the subject. These open-minded ones are utilizing Schrader Air Products, not just to hold work or blow away chips, but to produce complex units to close tolerances.

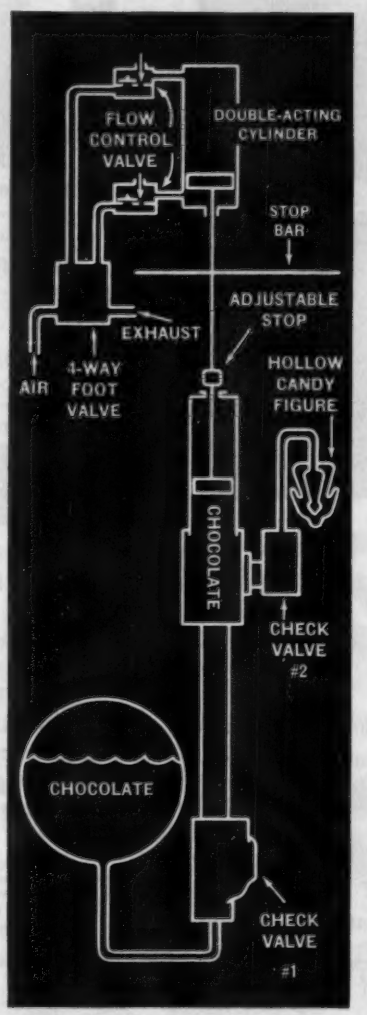
Air is a big boy now. It has grown up fast because automation came because pennies needed pinching. Because many operations in manufacturing turned out to be just plain dangerous. Then engineers found air was not only efficient, economical, and safe, but that products were already designed and produced to make air a logical way of performing hundreds of special jobs.

FOR EXAMPLE:

• Sweet words about air from a candy maker

At a Buffalo, New York, candy company, Schrader Air Products have been used to perform a complex measuring operation. To within one gram! Six Schrader double-acting cylinders are used to fill a bank of six more single-acting cylinders with a prescribed amount of chocolate. When a foot valve is released, the chocolate is forced into wax figurines, exactly filling them. And the entire installation is even covered and kept at a constant temperature to insure the proper chocolate viscosity.

Take a look at the schematic. It shows the arrangement by which the Schrader Air Products are adapted to an operation which might at first seem far outside the limits of air use. It was possible because some engineers put on their thinking caps.



Schematic shows how Schrader Air Products are adapted for precision handling of liquid chocolate.

• Talk about air's advantages being automatic—lend an ear

This is important to you, so don't wander off. When air is used to synchronize motions automatically, efficiency is almost sure to follow. BUT, the natural advantages of air multiply like rabbits. For instance, economy is basic. In many cases it can make the difference between profit and loss. Then, safety margins are widened by the use of special control techniques. Air's simplicity makes possible easy finger-tip and tip-toe operation of tiring hand and foot movements. Fatigue? Who's tired? Production goes up. Modern packaged control sets are so highly developed that most hazards of press operation are no longer applicable. Both hands must be used at once, and cannot stray into danger zones. Any machine using a mechanical clutch, shears, brakes and friction clutches can use special controls.

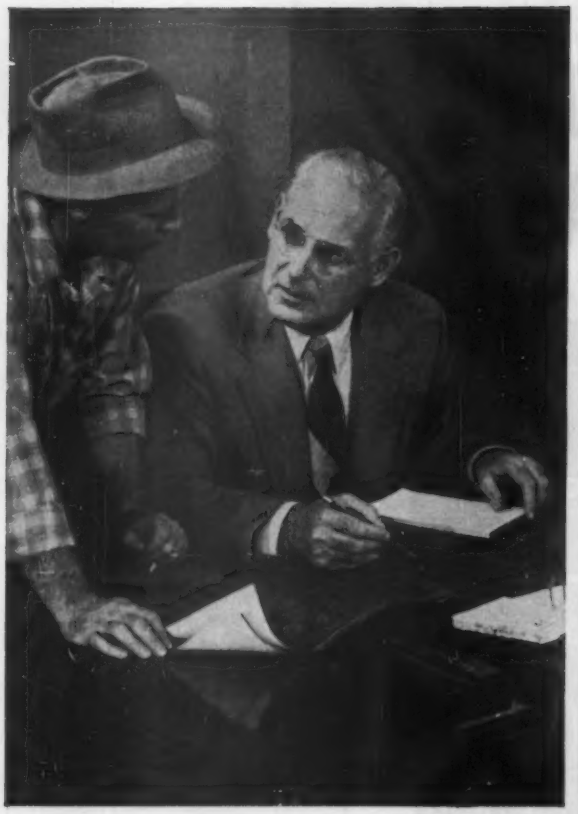
• We <u>like</u> to be taken advantage of

You can make use of Schrader's engineering facilities. That's why we *have* them. Upon request, Schrader engineers will assist in planning for the most efficient use of air in your plant, and in selecting the products best suited to a given application. Distributors are conveniently located to deliver Schrader Products in the shortest possible time.

Write to Schrader for information. Address A. Schrader's Son, Division of Scovill Manufacturing Company, Incorporated, 472 Vanderbilt Avenue, Brooklyn 38, N. Y.

Schrader®
ESTABLISHED IN 1844

FIRST NAME IN THE USE OF AIR
FOR INDUSTRIAL PRODUCTION AND CONTROL



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Whether it's special tools, jigs, fixtures or even special machinery, you'll find that CDT can build them better, faster and more economically. That's why so many of the nation's leading manufacturers regularly avail themselves of the specialized services of Columbus Die-Tool.

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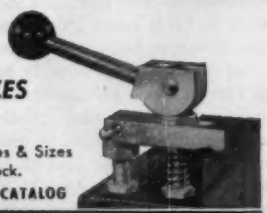

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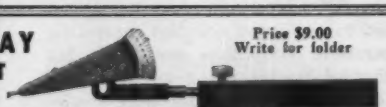

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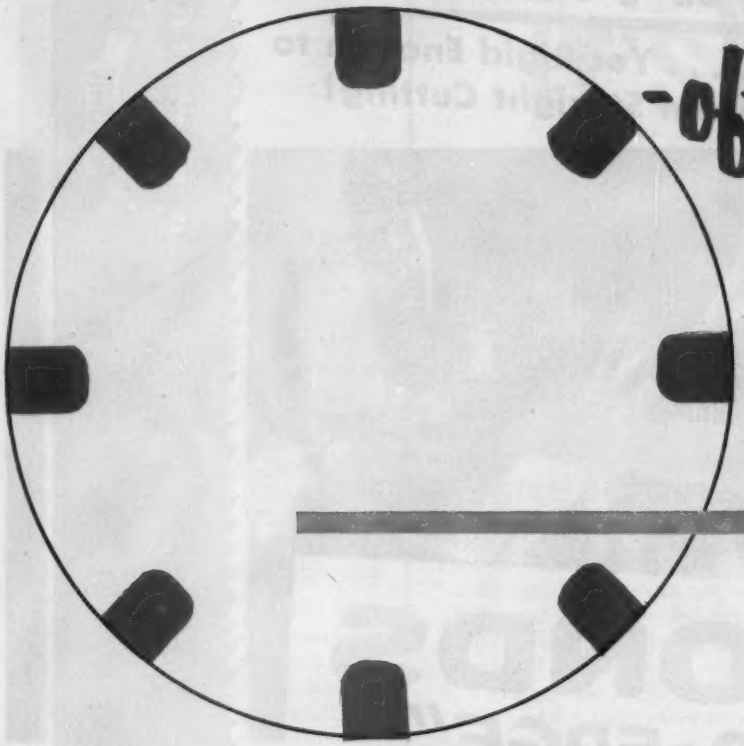
SIMPLE WAY TO CUT MACHINING COSTS

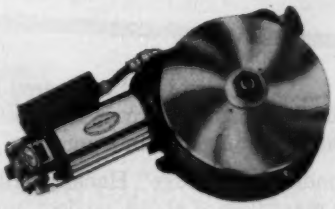


-often in half!

Suppose it takes x-seconds to machine a part. 3x-seconds to get the part to and from the machine tool. Cut 1x-second off handling time—you've cut machining costs in half.

Obvious, you say.
The trick is how.

Here's one way: Install a Bellows Rotary Work Feed Table. Your operator loads at one station while machining goes on at a second, parts are ejected at a third. The table is adjustable to position 4, 6, 8, 12, or 24 stations. It is air-powered electrically-controlled. The ten inch diameter table top can be drilled and tapped for mounting jigs and fixtures or for mounting oversize table tops. The table can be synchronized to the movement of drill press spindles or press rams. It is inexpensive to buy, inexpensive to install and can be readily moved from one machine to another. Simplest way you ever saw to save money in many machining operations.



Write for these free booklets

Describes the full line of Bellows Rotary Work Feed Tables and Bellows Index Tables: permissable loads, positioning speeds, positioning accuracy. Ask for Bulletins RT-1022 and RT-1326. Address Dept. AM-357. The Bellows Co., Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto, Ontario.

The Bellows Co.

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760-B

MANUFACTURERS OF "CONTROLLED-AIR-POWER" DEVICES FOR FASTER, SAFER, BETTER PRODUCTION

SHATTERPROOF...

for Maximum Safety... Yet Rigid Enough to Maintain Straight Cutting!

SIMONDS "WELD-EDGE" Power Hacksaw Blade

with The High Speed Steel Cutting Edge

This Simonds-Engineered Blade with its factory-controlled weld is especially designed to meet all plant safety and performance requirements — with real savings in time and cost per cut.

Simonds "Weld-Edge" Hacksaw Blades are *tough* — will not snap in operation regardless of abuse, neglect, machine condition or adjustment. These blades have a High Speed Steel cutting edge that resists wear and is adaptable for all types of cutting.

What's more, "Weld-Edge" Blades have a specially heat treated back that is not only shatterproof but possesses greater rigidity that pays off in straighter cuts and longer life.

For safety, dependability and increased output at lower cost, ask for SIMONDS "Weld-Edge" — the shatterproof blade with the Red End. All standard sizes available from stock.

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SAW AND STEEL CO.
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Talking About Die Sets

with
Phil Marsilius
Vice-President
The Producto Machine Co.

Master or Commercial: What Makes the Difference? The most obvious difference between a Master (Precision) set and a Commercial set is the price. The Commercial set costs less because less assembly time is required in its manufacture. Punch holder and die holder tolerances are the same for both grades of die set. However, extremely close tolerances for fit between pins and bushings on Master sets require more accurate honing of bushings in assembly. Master die set tolerances for parallelism between punch and die holder are also more critical than those for Commercial die sets.

Normally, the difference between pin and bushing diameters on die sets manufactured by our industry is never less than .0002" and ranges as high as .0009". There are die sets made to closer or looser tolerances than these, but generally speaking, the majority of die sets fall into this category.

Master die sets are manufactured to the low side of this tolerance scale and are held to a maximum of .0004" differential. This closer tolerance increases the useful life of precision sets by allowing for wearing of the pins and bushings in operation.

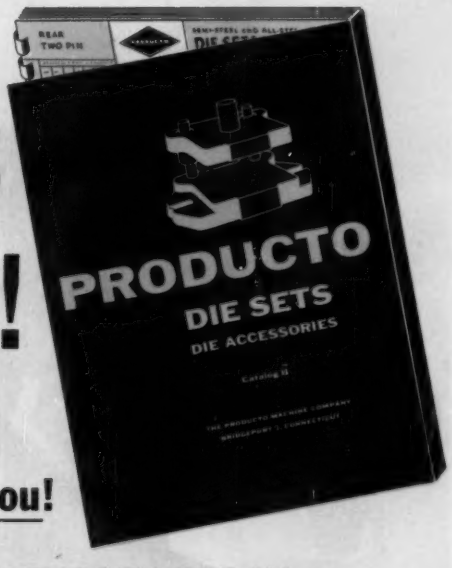
Commercial die sets are made throughout the entire range of this tolerance scale and, more often than not (to reduce assembly cost), are made to the higher tolerances. As a result, their accuracy will usually decrease much faster than that of Master die sets. While it is possible with this tolerance range to receive a Commercial set with the minimum pin and bushing fit allowed, you can be certain of longer die set accuracy only with a Master set, which is guaranteed to be held to the low side.

A "free-sliding fit" is one that permits the punch holder to move down on the guide pins of its own weight. It does not have any bearing on the degree of accuracy of the die set since a free-sliding fit can be supplied on both Master and Commercial sets. On Master sets, however, it is sometimes necessary to hone out the bushings to a full .0004" tolerance to provide a free-sliding fit.

EVERY die set MUST, of necessity, work freely in normal use, *on the press,* but catalog die sets should come apart and go together easily for bench work. With an occasional exception (when sets are made to the lowest tolerance for fit allowed), disassembly should be possible by hand without use of separating tools.

In making a choice, the degree of accuracy required and the life requirements of the die set should be the main points of consideration which determine whether you should order a Master or Commercial die set.

IT'S HERE!



A new catalog designed for you!

WRITE FOR YOUR COPY TODAY

Here, at last, is a die set catalog that makes your selection and ordering really easy. Producto's all-new catalog is compact for the die designer, convenient for the purchasing agent, a functional tool for the die maker.

These unique features make Producto's catalog much easier for you to use:

IT'S COMPACT. Though many items have been added, it has *fewer* pages because superfluous material has been eliminated. New products include Qwik-Fit Guide Pins, new Bushings with grease fittings, Lamina Bushings, Ring Punches and Dies, Toolroom Equipment, Lubrication Accessories and new Die Spring Selections.

IT'S COMPLETE, containing the greatest selection of die sets and accessories that has ever been offered to date.

ALL PRICES ARE NET and appear in a *separate pricing supplement,* removed from the technical section. No more time-consuming "discount" calculations.

NEW BINDING ARRANGEMENT lets you look at technical and pricing information *simultaneously.* No more flipping pages back and forth to get complete information.

STREAMLINED PAGE LAYOUT makes it easier for you to find essential data. Color highlights catalog numbers and drawings.

To make your die set ordering as painless as possible, write today for a free copy of Producto's new Catalog No. 11.

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Wherever die sets are used

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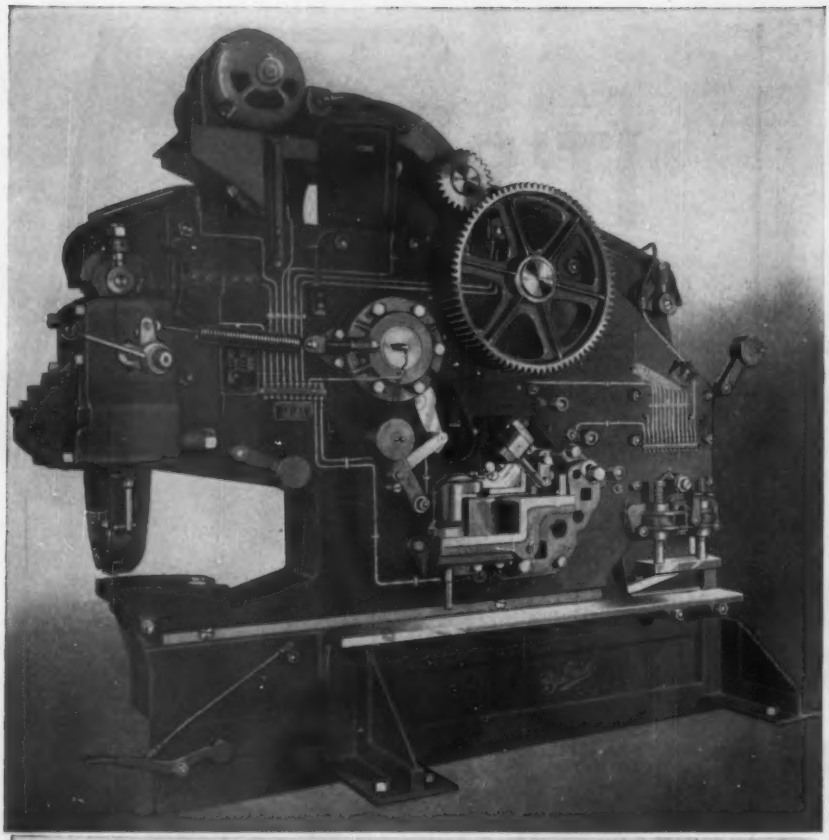
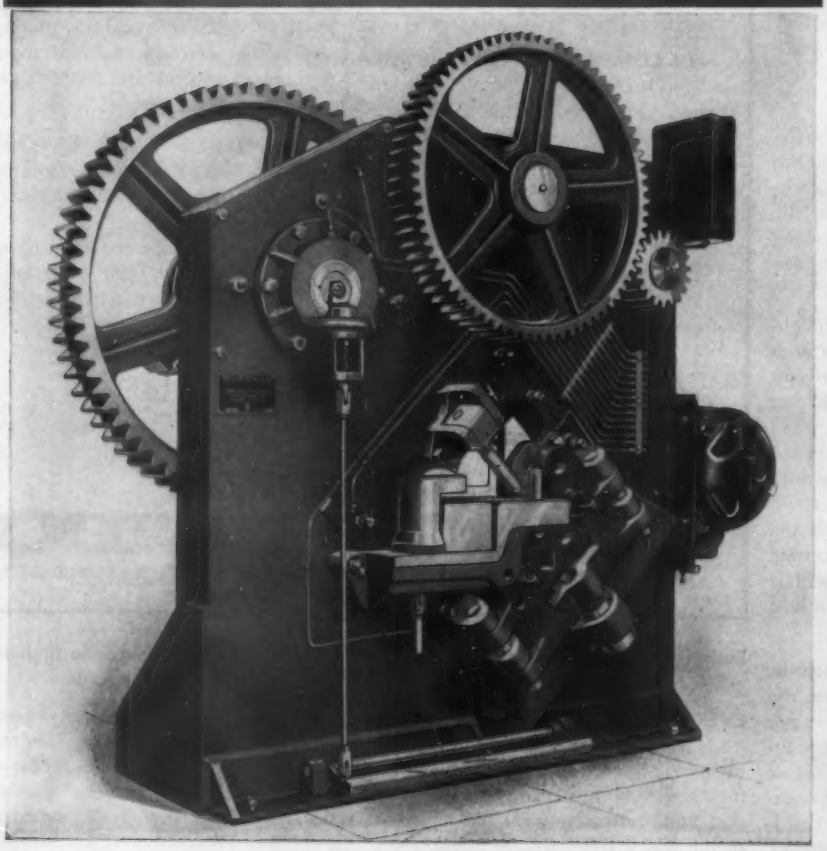
PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS



DO

"BUFFALO" IRON WORKERS

These powerful, multi-purpose Universal Diagonal machines shown at upper left punch flanges and webs of I-Beams, channels, girders, Bethlehem Beams and H-sections. They notch angles, tees, beams, channels and plates — shear plates, flats and angles — cut rounds, squares, angles at 45° and 90°, and tees. They have the versatility of the popular Universal Iron Workers, plus large capacity — for example, the No. 4½ U.D. Machine shown, has 1 9/16" x 1¼" or 1⅜" x 1⅜" punch capacity and will shear 1¼" plates thru center. It's built up to the job, too, with its welded steel plate box frame, heavy shafts, bearings, bolsters and plungers, plus centralized oiling system. Write for Bulletin 360-G for full capacities and details.



"BUFFALO" DIAGONAL BAR CUTTERS

— like this No. 9 model at left, are easy to set up, fast-cutting and trouble-free. Large knife openings permit wide flexibility of knife combinations for minimum tool changing. 6 sizes, to handle rounds, squares, angles, tees, flats, beams or channels at speeds between 18 and 30 strokes per minute. Largest size cuts 4½" rounds or 4" squares. Also available in diagonal and special models. Write for Bulletin 3295-C, which also describes "Buffalo" Billet Shears.

COLD BENDING AT PROFITABLE SPEED

Heavy industry uses "Buffalo" Bending Rolls like this big No. 2 Horizontal model illustrated on facing page to produce arcs, circles and spirals from heavy sections at profitable speeds. No tooling is required — rolls are quickly changed and adjusted to handle angles, tees, beams, channels, flats, tubes and pipes at the desired radius. All work is bent cold, and commercially accurate curves are easily obtained. Write for Bulletin 352-C.

MORE BIG JOBS EASIER WITH "BUFFALO" MACHINES!

• CUTTING • SHEARING • BENDING • PUNCHING • SLITTING • NOTCHING

"Buffalo" machines have long been the choice of industries doing heavy structural fabrication — from bridge firms to manufacturers of large machinery. Each of these machines is engineered with the power, rigidity and convenience of operation to turn out the work accurately at profitable speeds. And you have a wide selection — Billet Shears, Bar Cutters, Bending Rolls, Wrapping Rolls, Iron Workers, Mill Type Shears and many others. All are built to the "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life. Write us for recommendations on *your* fabrication problem!

LARGE-DIAMETER ANGLE BENDING

like the above is routine with "Buffalo" Bending Rolls; one tank fabricator forms rings up to 104-ft. in diameter, to fractional-inch tolerances.

ESTABLISHED 1877 "Buffalo" MEMBER N.M.T.B.A.

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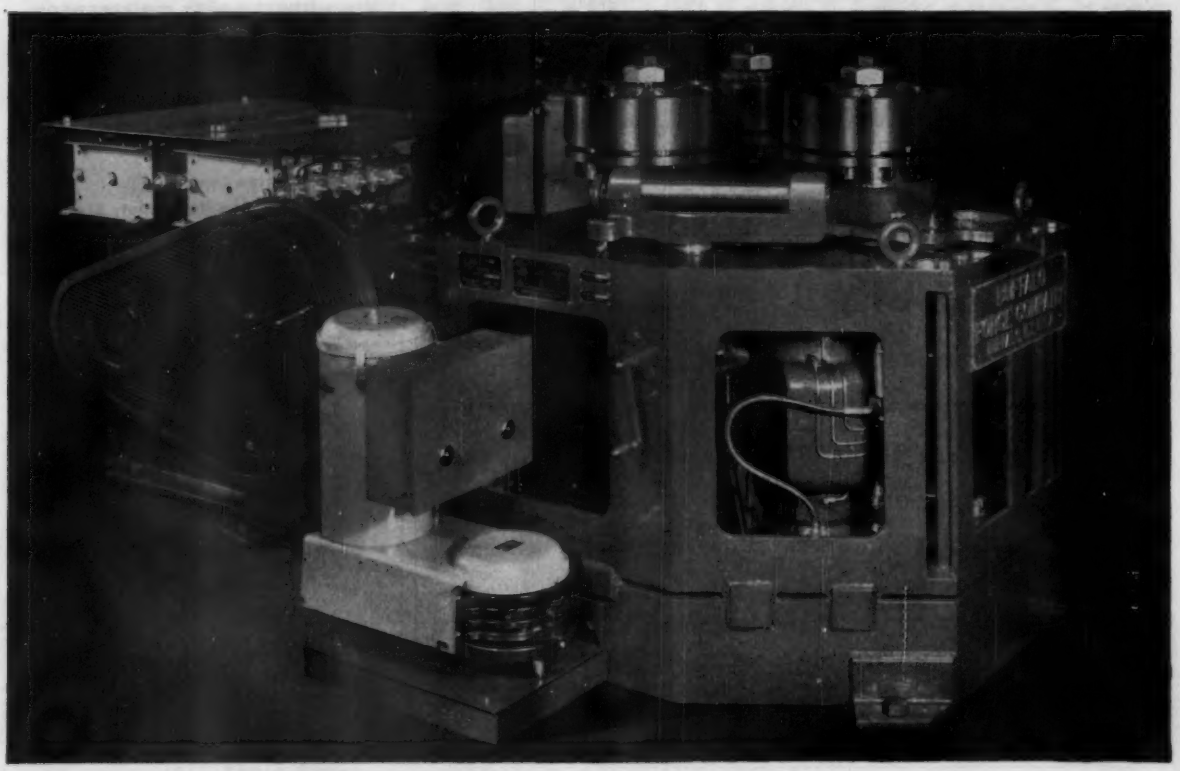

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INTERNAL INDICATORS

(for inside measurements .155 to 24 inches). Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001.

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OTHER JOHANSSON PRODUCTS

Micrometers, Snap Gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators, Interferometers, Plugs, Rings and Special Gages.

C E J MIKROKATOR 502-E

Mikrokator No. 502-E is a precision instrument for dimensional measurement.

It is provided with a mechanical, frictionless amplification device without sliding bearings or gears and there is no play, wear or binding.

The purpose of the instrument is to give accurate measurements both in mass production checking and in checking individual parts.

The instrument is made in three different designs and in both inch and millimeter.

Cat. No.	Range	Graduated	Shaft Diameter
502-E-2	.016	.0002	⅜"
502-E-4	.004	.00005	⅜"
502-E-5	.002	.00002	⅜"
502-E-6	.0012	.00001	⅜"

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WHAT'S AHEAD?...see Page 2

Yes, American Machinist's "Chips" column on page 2 of each issue forecasts coming events in future issues, and also points up behind-the-scenes stories of how current articles are gathered and written. Form the "Chips" habit—read it every issue.

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Built to serve you for its normal life without costly maintenance

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... complete flexibility—interchangeable suspension—quick voltage change.

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New 24-page brochure gives complete engineering data

Here's the story of fatigue-proof steel bars

MADE BY THE e.t.d. PROCESS

Elevated Temperature Drawing

*a **new** material—made by*

*a **new** process—with*

*a **new** combination of properties*

High Strength
Free Machining
Uniformity
Fatigue Resistance
Wear Resistance
Dimensional Stability

Plus Accuracy, Smooth Finish, and Straightness

T. M.—Trade-marks of La Salle Steel Company

Use this coupon to request your copy

La Salle STEEL CO.

1416 150th Street

Hammond, Indiana

Please send me your new 24-page brochure, "A New Material"

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

Any Dial Indicator Dollars in your Suggestion Box?

BY

ROBERT C. GOULD, SALES ENGINEER

STANDARD GAGE COMPANY, INC.

PLANT suggestion boxes are paying-off to management and employees alike. These boxes are providing a major share of the "new ideas" leading to improved operating efficiency, better products and lower costs. It is not surprising that many of the suggestions cover the use and care of Dial Indicators. We believe that some of them are worth discussing here.

Q. How many times do you pay for a dial indicator?

Initial price is only *first* cost. Overall cost includes paperwork, labor and repair parts. On a repair purchase order the paperwork averages $14.75. Repair an indicator 3 or 4 times and you've paid for it 2 or 3 times! Then, add to this the cost of higher inventories, inspection errors and production delays. Get the PRICE from purchasing... the COST from accounting.

Q. Why is it necessary to stock large quantities of dial indicator repair parts?

It isn't! Wear should not account for more than 10% of all indicator repairs; 90% of maintenance should be for cleaning only.

Q. Are jewel bearings worth the extra cost?

Jewel bearings add considerably to the initial price of a dial indicator—but what's the return on your investment? More accuracy? Usually not. More SHOCKPROOF? Definitely not. Easier maintenance? Most certainly not. Does this mean that jewel bearings are worthless? No, indeed! Where the last milligram of friction is highly critical, such as in Standard's CHECK MASTER TEST INDICATOR, jewel bearings are worth the cost. But... AGD Dial Indicators do not need jewels for accuracy; nor are they as SHOCKPROOF with jewels. Standard's special bronze, minimum-of-friction, long-life bearings have proved themselves superior to jewels by nearly 20 years of testing and customer use.

Q. "100% SHOCKPROOF"—is it worth the extra cost?

Definitely! Fully SHOCKPROOF is a must. But with Standard it costs nothing extra! Standard's original SHOCKPROOF design prevents *any* shock on the contact point from ever reaching the precision gears and bearings. Over 15 years of trouble-free use by industry proves the point!

Your Man-from-Standard will be glad to discuss these and other Dial Indicator questions with you. It may well be your "first step" to lower indicator cost.

a complete line of **GAGES**

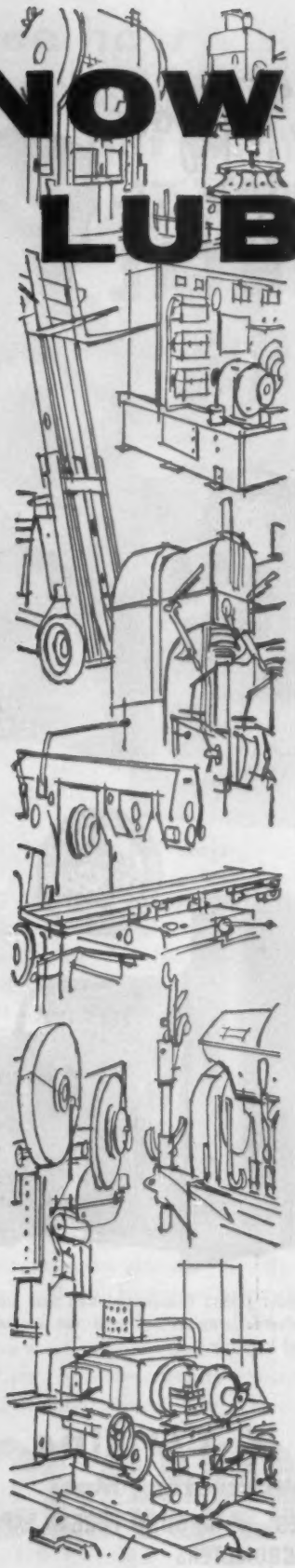
- indicating,
- fixed and
- adjustable limit types

WRITE FOR CATALOG

STANDARD Gages

173 PARKER AVENUE • POUGHKEEPSIE, NEW YORK

NOW! ATLANTIC LUBRICANT 54



. . . the one lubricant for practically every industrial need

New Atlantic Lubricant 54 is industry's closest approach to the universal grease lubricant. The use of this distinctively purple grease in your plant practically assures the correct choice in any application. It has given outstanding performance in all types of machinery.

Every shop, large or small, can make economical use of Atlantic Lubricant 54 because it gives

- . . . multiplicity of use—reduces chance for error, cost of warehousing, and handling
- . . . outstanding rust protection—protects ferrous surfaces under wet conditions
- . . . excellent lubrication performance from very low to extremely high temperatures
- . . . unusual stability against oxidation and softening under rugged working conditions
- . . . positive identification due to its purple color

This product is available from warehouses conveniently located throughout Atlantic's marketing territory and may be ordered through the nearest office listed below.

ATLANTIC

LUBRICANTS • WAXES
PROCESS PRODUCTS

PHILADELPHIA, PA.
260 So. Broad St.

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Chamber of Commerce Building

PROVIDENCE, R. I.
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READING, PA.
First and Penn Avenues

CHARLOTTE, N. C.
1112 South Boulevard

Another Bath Tap job well done... for CONTINENTAL MOTORS

Bath Taps are used for accurate threading operation on the crankshaft flange of the JD382 Continental Red Seal diesel engine.

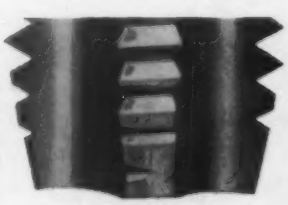
Skilled workmanship — plus the use of modern equipment and the best quality tools, maintains a high standard of production at the Muskegon plant of Continental Motors Corporation — where Red Seal diesel and gasoline engines are built for transportation, construction, farm and industrial use.

Selection of Bath Taps for threading Red Seal parts is proof of their dependability — since accuracy in the machining of components makes a big difference in the smooth operation of these powerful Continental engines . . . many of them, custom-built for special use.

In addition to taps for every-day, in-line production — Bath has earned a reputation for the design of custom-built taps requiring special creative engineering.

Do you have a threading problem? We'll be glad to put our experience to work for you.

Model JD382 Continental Red Seal diesel industrial engine — built for economy and long life.



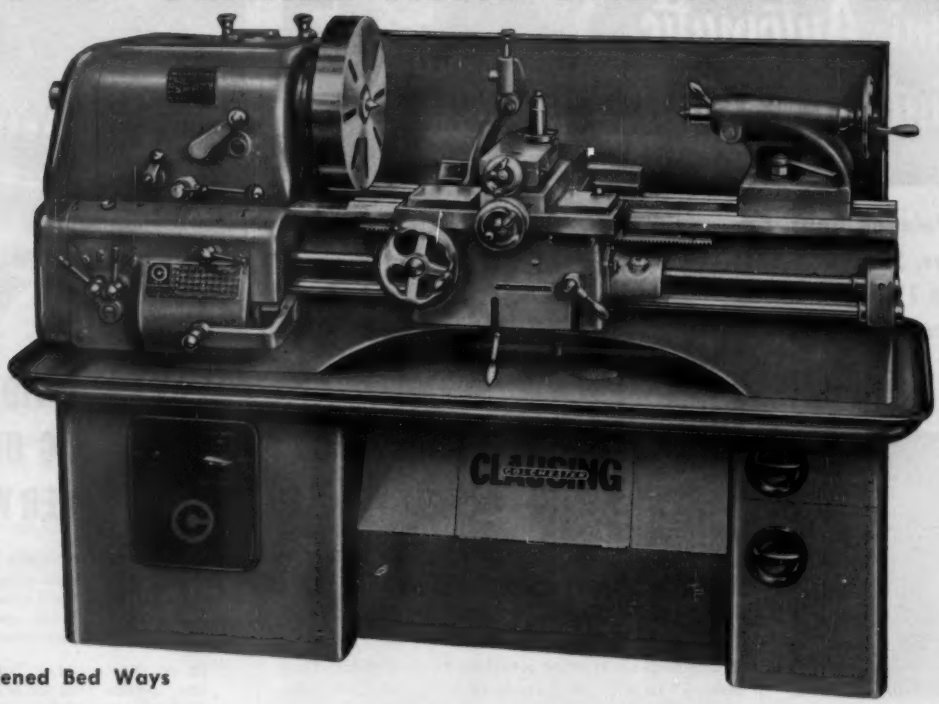
JOHN BATH & CO. Inc.

22 Grafton St., Worcester, Mass.

CYLINDRICAL AND THREAD GAGES • GROUND THREAD TAPS
INTERNAL MICROMETERS

See how much MORE you get with... CLAUSING COLCHESTER

13"-15"-17" GEARED-HEAD PRECISION LATHES



Hardened Bed Ways

BIG CAPACITY—larger spindle capacities (see chart below). Swing for the gap bed models is 28" for the 17"; 24" for the 15"; and 18" for the 13". Between centers capacities: 78" for the 17" lathe; 30" and 48" for the 15"; and 24" and 36" for the 13". Geared-head drive powered by multiple V-belts.

CAPACITY	17"	15"	13"
THRU-HOLE	3 1/16"	2 1/16"	1 1/16"
NOSE TAPER KEY DRIVE	L-2	L-1	L-0

HEAVY-DUTY CONSTRUCTION — Massive semi-steel beds with elliptical cross ribbing. Induction hardened, precision-ground V and flat bed ways. Geared-head and quick-change box run in bath of oil, all gears shaved and hardened. Power feeds taken from separate feed rod, lead screw used only for screw cutting. Note heavy-duty construction of tailstock, and of carriage assembly with double-walled apron.

PRECISION PERFORMANCE—built to American toolroom lathe standards of accuracy. Have GAMET MICRON tapered roller bearings . . . with oil flow lubrication . . . most advanced and accurate bearings known to industry.

PROMPT DELIVERIES — through your authorized CLAUSING-COLCHESTER dealer.

OUTSTANDING QUALITY and VALUE — Clausing-Colchester lathes are acknowledged the world over to be the finest value and the most accurate in their class!

PRICES — 13" cabinet base models, including motor and controls, start at $1952; 15" cabinet base, illustrated, at $2744; 17" model at $4345. 5 straight bed and 6 gap bed models available, with choice of one or two speed motors.

WRITE FOR ILLUSTRATED LITERATURE

CLAUSING COLCHESTER

CLAUSING DIVISION
ATLAS PRESS COMPANY
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ECONOMY

TYPE "P"

Semi-Automatic Pointing MACHINE

For Pointing Bolts, Cap Screws, Studs and Rods ¼" to 1½" in Diameter that cannot be Automatically Fed.

SHORT WORK ATTACHMENT

Typical Operations Performed on Type "P" Semi-Automatic Pointing Machine.

Production rates from 480 to 1920 pieces per hour make it an ideal secondary machine for short runs on bolts or parts that cannot be automatically fed. Lower production rates available if specified.

Lag screw or cone points can be produced using the ECONOMY four cutter pointing head and suitable cam insert for long point.

Tooling changes easily made. Wide selection of feeds and speeds.

Optional short work attachment permits handling bolts 1" to 4½" and studs to 5" length with complete operator safety.

Write for Details & Complete Information

THE ECONOMY LINE

Automatic Shaving Machines
Automatic Pointing & Shaving Machines
Automatic Pointing Machines
Semi-automatic Pointing Machines
Automatic Pointing & Threading Machines
Double End Automatic Pointing Machines

THE ECONOMY ENGINEERING CO.
WILLOUGHBY, OHIO

WILLOUGHBY-OHIO

Designers and Manufacturers of Secondary Operation Machines since 1915

WORRIED ABOUT PRECISION PIVOTS?

Call VK

Steel, chromium plated, or carbide precision pivots to .013" diameter. 1 RMS or finer surface finish. Diameter tolerances to .000010". Chamfers, radii, lapped ends, etc.

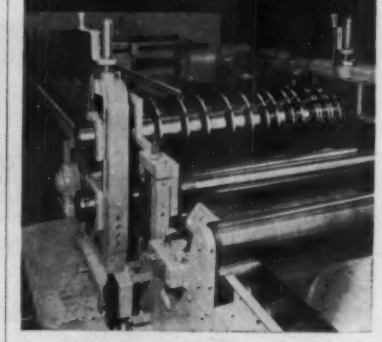
Also volume production lapping of flat or round production parts.

Submit your specifications

THE VAN KEUREN COMPANY
176C WALTHAM STREET
WATERTOWN, MASS.

The protographer's nightmare at the left consists of a lump of sugar and four VK Precision Parts. The "eyes" are .080" long.

YODER SLITTING LINES



PAY BIG DIVIDENDS WORKING ONLY ONE DAY PER WEEK!

In one plant, two Yoder tube mills and about 50 punch presses are being supplied with slit strands by one Yoder Slitting Line operated an average of only *seven hours per week.*

In another plant, a Yoder slitting line, *operated from six to eight hours per week,* is supplying two intermittently operated roll forming machines with total requirements averaging 100,000 feet per week.

These typical examples demonstrate, first, the big potential output of a relatively small, inexpensive Yoder standardized Slitting Line and, secondly, its big profitability. Assume production of only 35 tons of slit strands per 8 hour shift, one day per week, and the total per year would be 1750 tons. Estimating the saving in slitting cost at only one-half cent per lb., the total annual saving would be $17,500.00.

Besides the big convenience of doing your own slitting, such savings will often repay the investment in a few months.

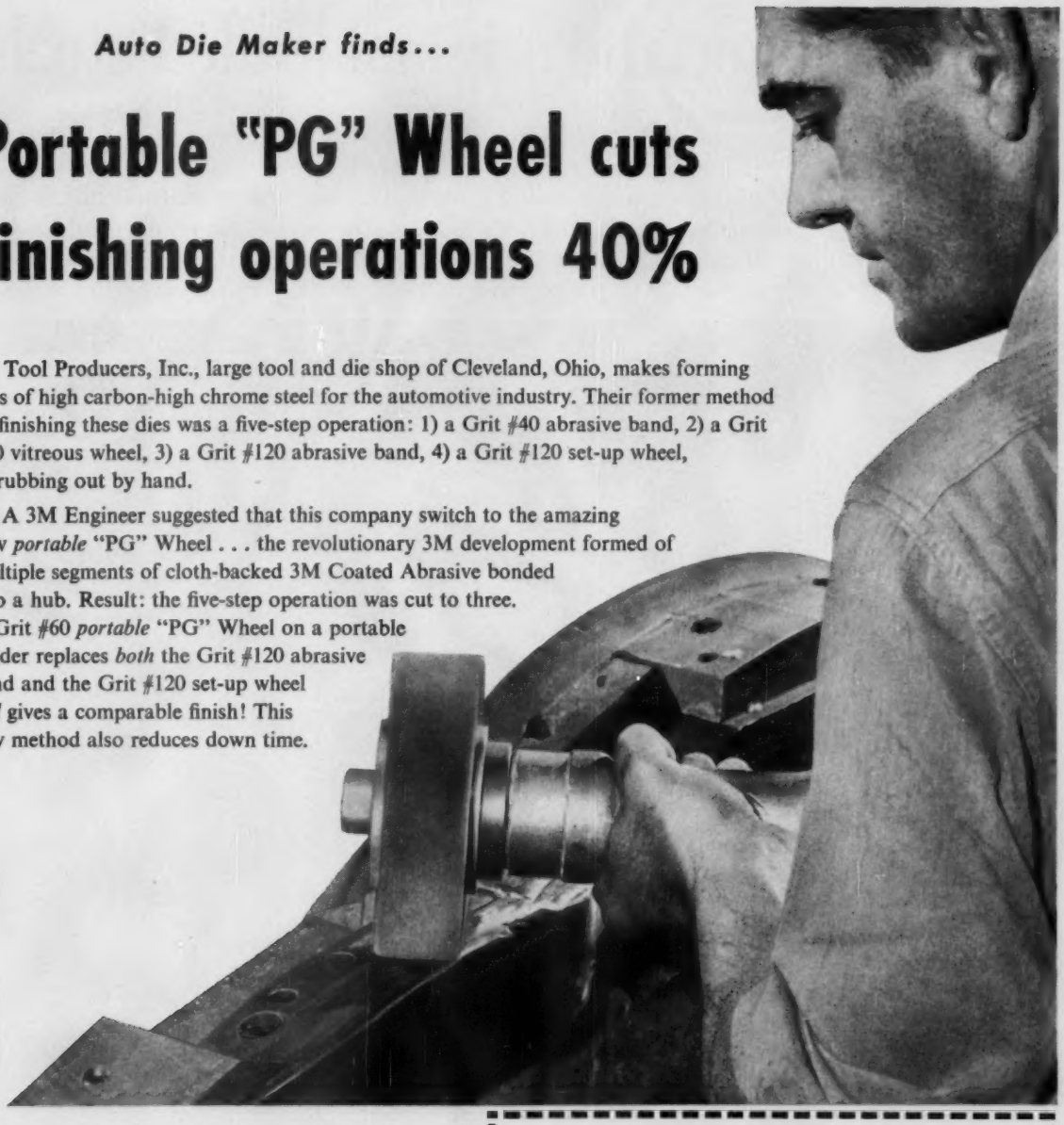
The Yoder Slitter Book **is a comprehensive treatise on slitter operation and economics, with time studies, cost analyses and other useful data. It is yours for the asking.**

THE YODER COMPANY
5519 Walworth Avenue • Cleveland 2, Ohio, U. S. A.

ENGINEERING YODER MANUFACTURING SLITTING LINES

Auto Die Maker finds...

Portable "PG" Wheel cuts finishing operations 40%

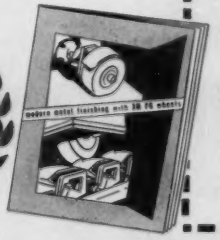


Tool Producers, Inc., large tool and die shop of Cleveland, Ohio, makes forming dies of high carbon-high chrome steel for the automotive industry. Their former method of finishing these dies was a five-step operation: 1) a Grit #40 abrasive band, 2) a Grit #60 vitreous wheel, 3) a Grit #120 abrasive band, 4) a Grit #120 set-up wheel, 5) rubbing out by hand.

A 3M Engineer suggested that this company switch to the amazing new *portable* "PG" Wheel . . . the revolutionary 3M development formed of multiple segments of cloth-backed 3M Coated Abrasive bonded into a hub. Result: the five-step operation was cut to three. A Grit #60 *portable* "PG" Wheel on a portable sander replaces *both* the Grit #120 abrasive band and the Grit #120 set-up wheel *and* gives a comparable finish! This new method also reduces down time.

STEP UP PRODUCTION and cut costs in *your* plant with 3M's new *portable* "PG" Wheel. It's self-conforming—requires no breaking-in or dressing—and retains its shape throughout its working life. Send coupon today for full facts.

3M ABRASIVES



Minnesota Mining and Manufacturing Co.
Dept. AK-37, St. Paul 6, Minnesota

☐ *Send me full details on the portable "PG" Wheel*

☐ *Please have a 3M Representative call*

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....ZONE.....STATE.....

Made in U.S.A. by MINNESOTA MINING AND MFG. CO. General Offices: St. Paul 6, Minn. In Canada: P.O. Box 757, London, Ontario. Export Sales Office: 99 Park Avenue, New York City. Makers of "SCOTCH" Brand Pressure-Sensitive Tapes, "SCOTCH" Brand Magnetic Tape, "3M" Adhesives, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing.

PRODUCT OF 3M COMPANY RESEARCH

Inland Ledloy*...the original leaded steels

Nearly twenty years ago, Inland started a metalworking revolution with its discovery of how to add lead to steel. The first experimental heat and the first production heat of leaded steels were made in Inland furnaces. Since then, by unending probing, refining, and perfecting, Inland has learned the secrets of making fine leaded steels. Today, Inland, the largest producer of leaded steels, sets the standards with which all other free machining steels are compared.

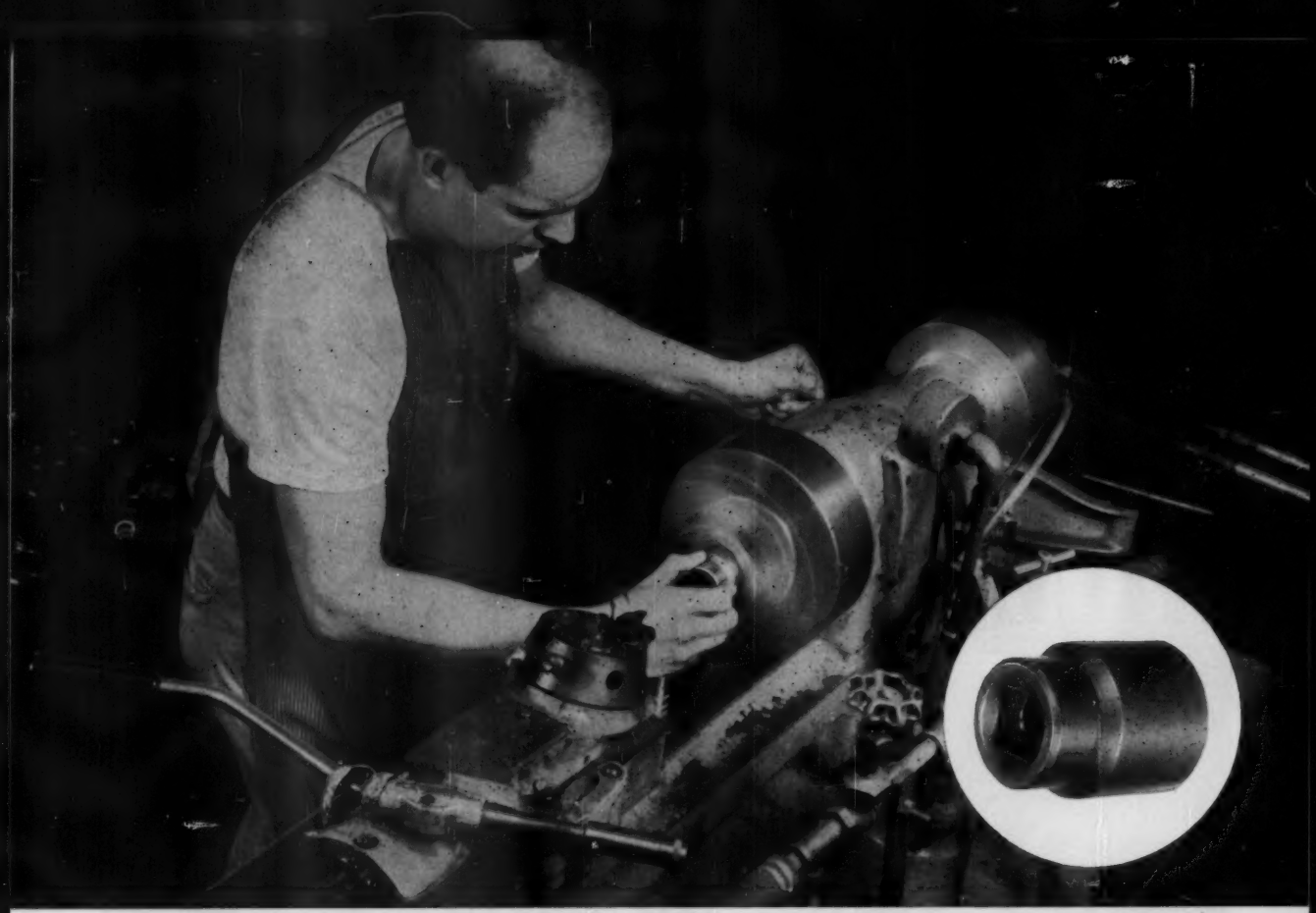
The precise gunning of 30 pounds of tiny lead pellets into 10,000 pounds of molten steel is the most critical step in the production of leaded steels. The combined experience of the crew assigned to this exacting operation is one of the key reasons for the consistently high quality of Inland Ledloy steels.

The addition of lead does amazing things to the machinability of steel without affecting any of its desirable mechanical properties. A switch to Ledloy that results in a 50% increase in production rate is not uncommon, and, in some automatic screw machine operations, Ledloy has replaced brass. Inland's twenty years of experience with leaded steels helps make Ledloy steels the world's most machinable.

Experience makes Inland Ledloy better

INLAND LEDLOY is sold in cold drawn form, under various trade names, by leading cold drawers and steel warehouses from coast to coast.

***INLAND STEEL COMPANY** 38 South Dearborn Street • Chicago, Illinois Sales Offices: Chicago, Milwaukee, St. Paul, Davenport, St. Louis, Kansas City, Indianapolis, Detroit, New York • *registered trade name of Inland Steel Company, pioneer in the development of leaded steels.*



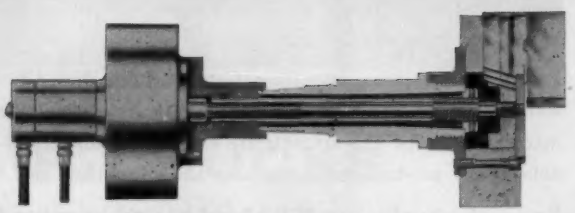
Skinner Power Chuck eliminates cost of special grinding operation . . . increases production, too

In this plant, a Skinner "junior" Power Chucking Unit replaces the standard collet chuck of this small Hardinge turret lathe.

When the collet was used, work pieces had to be held to tolerances of .004" for proper chucking, which made necessary a special grinding operation. Installation of this Skinner Power Chucking Unit eliminated this special operation, since the jaw movement of the Skinner Power Chucking Unit will permit wide variations in diameter with no chucking problems whatever.

In addition to this saving, the instantaneous automatic gripping and releasing of the work pieces has notably increased production.

Skinner Power Chucks will convert your present lathes — small and large — into high-production machines, and will greatly reduce your most important cost factor — overall machining time. Write Department 103 and ask for Catalog 68P, with complete specifications, applications, and installation instructions.



Simple, Dependable, Safe Operation

The tight gripping jaws are closed or opened instantly by an actuating wedge operated by a double-acting air cylinder. This simple mechanism is positive and trouble-free — there are only four moving parts in the chuck head. If air pressure suddenly fails, the jaws do not release the work piece, but continue to hold it tight until air pressure is restored.

Reduces operator fatigue, increases efficiency

Especially on your larger lathes, where hand wrenching is a time-consuming, fatiguing process, Skinner Power Chucks assure more efficient operation — since air pressure does the hard work. Operator's hands are free to guide and position work pieces accurately.

SKINNER ELECTRIC VALVES

THE CREST OF QUALITY

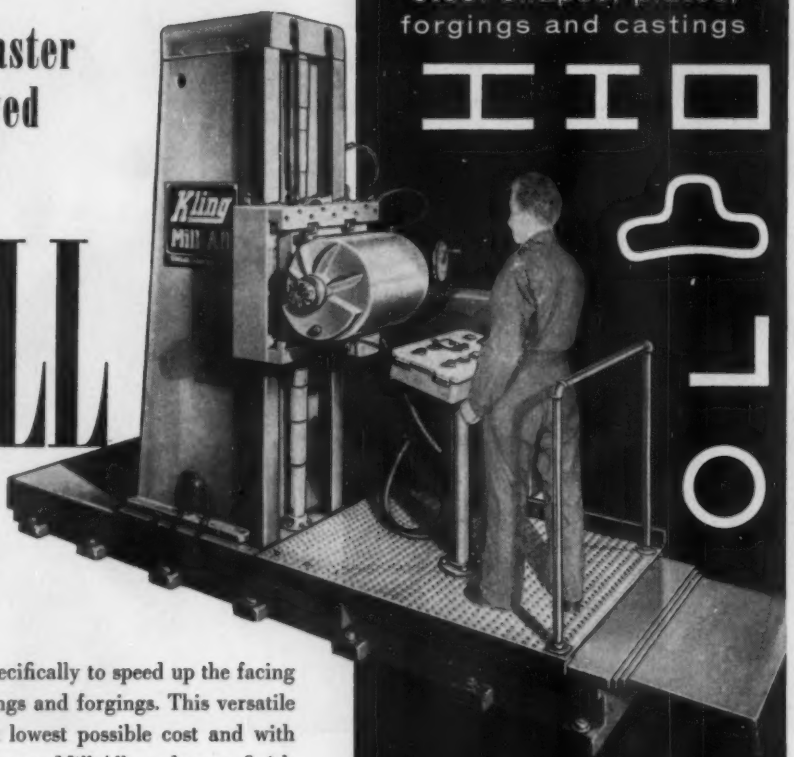
THE SKINNER CHUCK COMPANY

Established 1887

NEW BRITAIN, CONNECTICUT

CUT
up to 1,000% Faster with New Improved Kling MILL-ALL

for facing all structural steel shapes, plates, forgings and castings



The new Kling Mill-All is designed specifically to speed up the facing of structural steel shapes, plates, castings and forgings. This versatile machine cuts up to 1,000% faster at lowest possible cost and with exceptional ease of operation. What's more, Mill-All produces a finish better than most commercially-milled finishes.

Extra power is an important feature of the Mill-All. 40 h.p. is standard with 75 h.p. cutter motor available. Almost any size of machine and type of worktable are available to make Mill-All adaptable to any production requirement and diversified use.

Write today for the new Mill-All bulletin with complete details and specifications!

Here Are A Few Of The Important Kling Mill-All Features...

- Primary construction of steel weldments
- Ball bearing type feed screws covered by telescoping brass covers
- Both horizontal and vertical ways have non-metallic facings
- Telescoping steel covers protecting horizontal ways and base are strong enough to walk on
- Slide mounted motor gives 10" of in-and-out cutter travel
- Each machine has two rates of feed—based on customer requirement; maximum feed 80" per minute

This outline of average Mill-All cutting times on structural shapes will give an idea of the important time-savings that can be made with this machine. Depth of cut is ½ except for plate facing where depth of cut is ¼". Time given is for 1 cut.

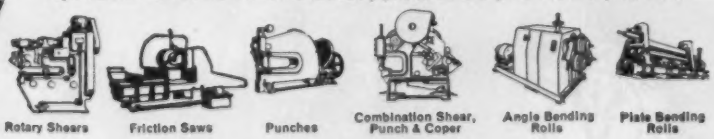
Type of Work	Time
4" - 13 lb. B.S.	6 seconds
6" - 12.5 I-Beam	8 seconds
24" x 12" x 100 lb. W. F. Beam	48 seconds
8" x 8" x 1" Angle	14 seconds
24" x 36" plate, face one side	8 minutes

For data on other Kling Metal Working Machines ask for Bulletin 100

KLING BROS. ENGINEERING WORKS
1320 N. KOSTNER AVE. • CHICAGO 51, ILL.
Exclusive Canadian Distributor: Brown-Boggs Foundry & Machine Co. Ltd., Hamilton, Ont.
Export Distributor: Simmons Machine Tool Corp., 50 E. 42nd St., New York 17, New York

Since 1892

Kling



Rotary Shears | Friction Saws | Punches | Combination Shear, Punch & Coper | Angle Bending Rolls | Plate Bending Rolls

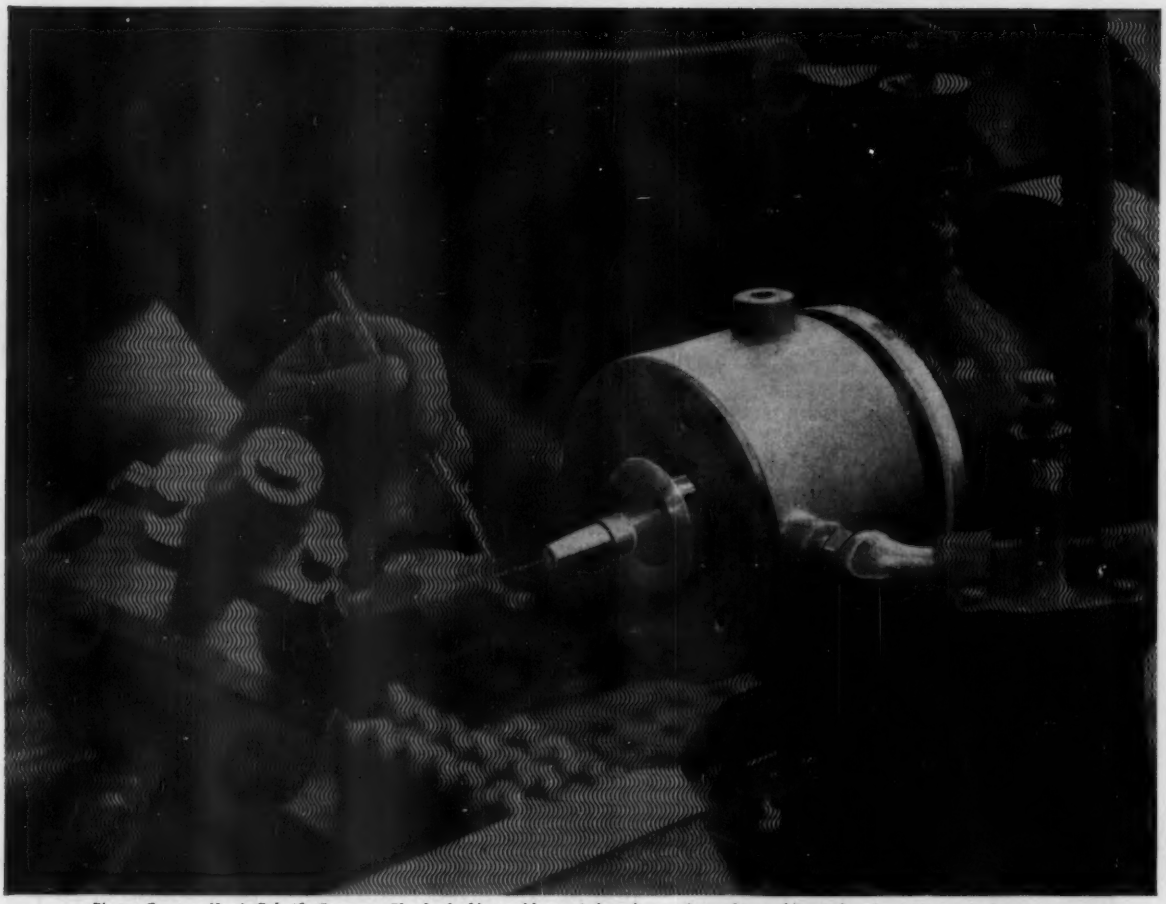


Photo: *Courtesy Harris Calorific Company, Cleveland, oldest and largest independent producer of gas welding and cutting equipment in the country.*

ERICKSON AIR CHUCKS

a hot tip for cutting costs on cutting-torch tips

Erickson '09 Model Air Chuck for heavy work. Quick-acting air chuck, with leverage principle, gives 3 to 4 times holding power of ordinary chucks.

Bothered by a tough holding problem? Then let us show you how Erickson holding tools speed production, lower costs. Call us or write for Catalog K.

"We have used Erickson Chucks since 1942 . . . and would recommend Ericksons to any plant which wants to increase production . . ." That is the report from Harris Calorific Company, big-name manufacturer of gas cutting and welding equipment.

The company uses four No. 400 Erickson Air Chucks for finishing leaded copper cutting-torch tips. Operations consist of drilling, reaming and polishing—at the rate of approximately *100 pieces per hour per chuck*.

Compared to previous methods, Harris Calorific Company claims, trueing-up time has been cut 70% . . . chucking time 60% . . . set-up time 25%.

Let an Erickson representative show you how to cut your production costs—*accurately*—with Erickson Air Chucks.

AA-3709

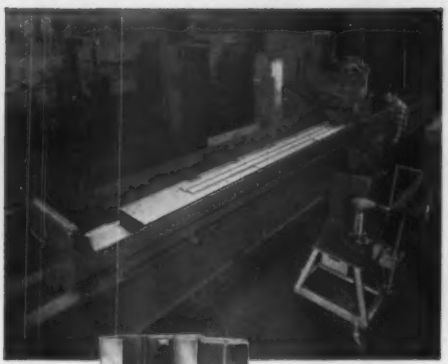
ERICKSON TOOL COMPANY

2309-3 Hamilton Avenue • Cleveland 14, Ohio

COLLET CHUCKS
FLOATING HOLDERS
TAP CHUCKS
TAP HOLDERS
AIR-OPERATED CHUCKS
EXPANDING MANDRELS
EXPANDING-COLLETS
SPECIAL HOLDING FIXTURES

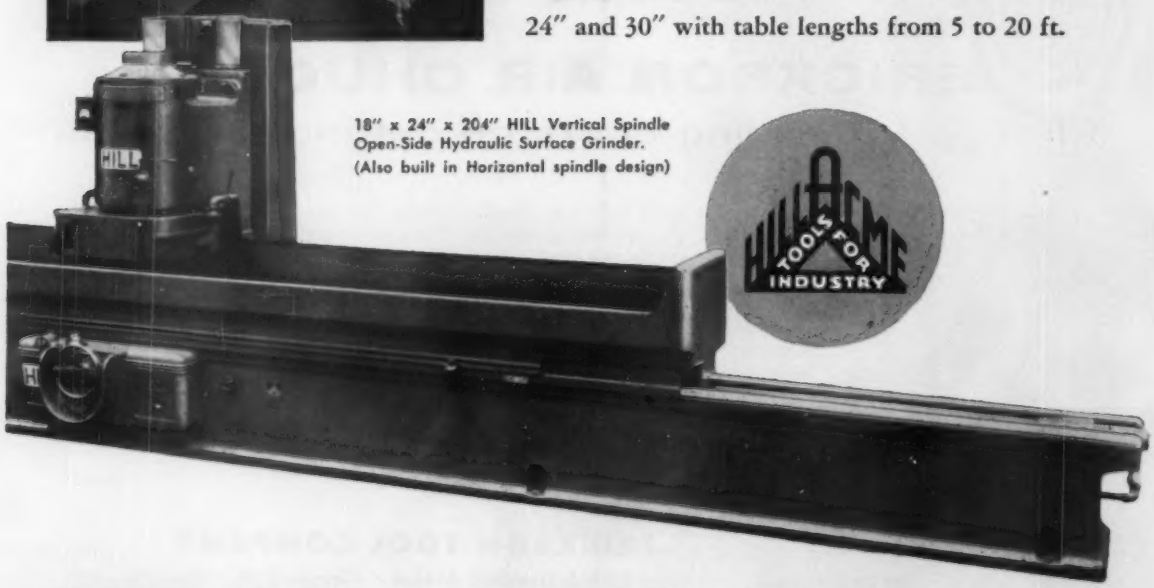
EVERY HEAVY DUTY SURFACE GRINDER SHOULD HAVE:

- *Open-side Accessibility*
- *100% Hydraulic Table Drive*
- *Built-in Spindle Motor*
- *Centralized Controls*
- *Low Pressure Hydraulic System*
- *One-Shot Lubrication System*
- *Adequate Safety Devices*



BUT THEY DON'T—

So GET A HILL with ALL the above features *plus* many other design improvements which insure rapid stock removal and accurate grinding of flat surfaces within the periphery of the grinding wheel. HILL Vertical Spindle grinders are built in table widths of 18", 24" and 30" with table lengths from 5 to 20 ft.

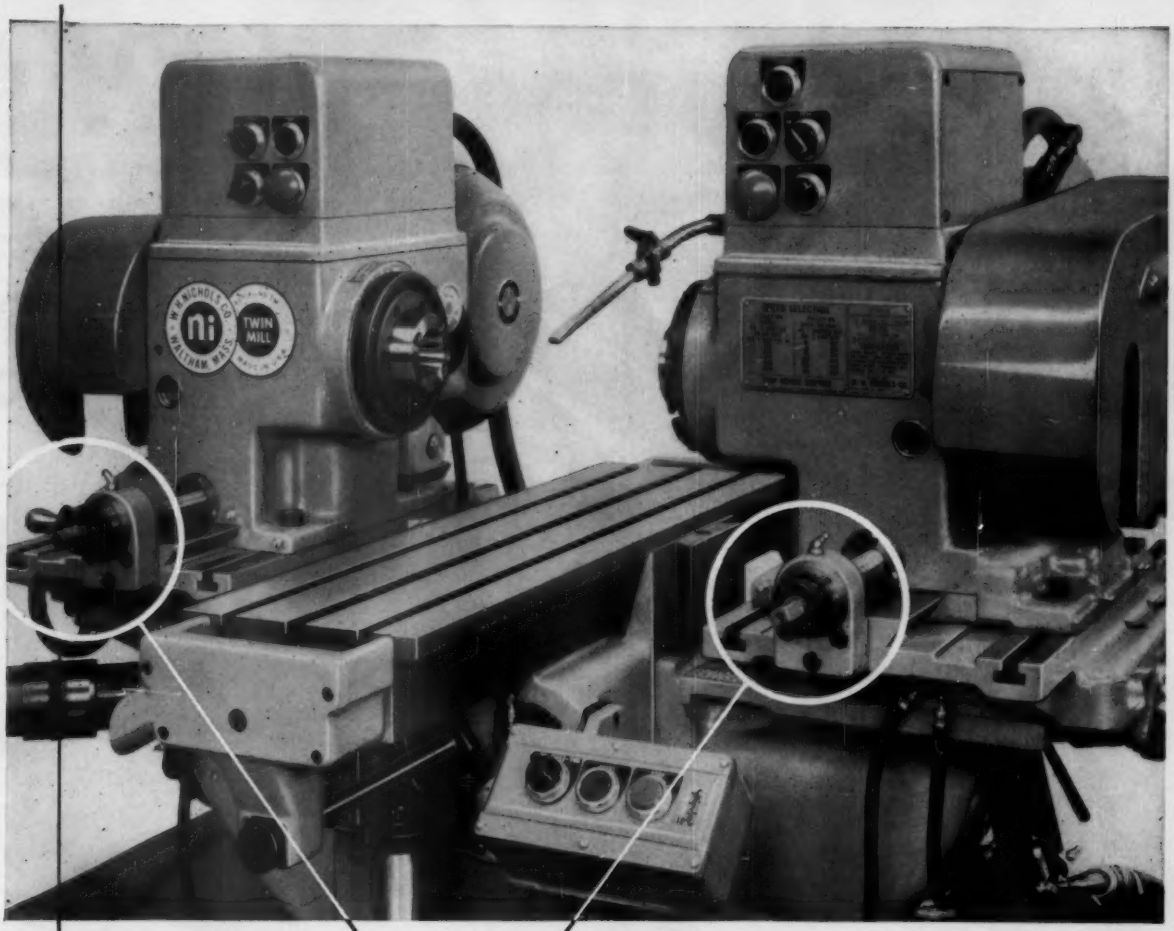


18" x 24" x 204" HILL Vertical Spindle Open-Side Hydraulic Surface Grinder. (Also built in Horizontal spindle design)

THE HILL ACME COMPANY

1201 WEST 65th STREET • • • CLEVELAND 2, OHIO

"HILL" GRINDING & POLISHING MACHINES • HYDRAULIC SURFACE GRINDERS • ALSO MANUFACTURERS OF "ACME" FORGING • THREADING TAPPING MACHINES • "CANTON" ALLIGATOR SHEARS • BILLET SHEARS • "CLEVELAND" KNIVES • SHEAR BLADES



NICHOLS TWIN MILL . . . SOMETHING NEW HAS BEEN ADDED

Now, the Nichols Twin Mill offers dovetail slides with micro-feed screws for *longitudinal* adjustment of milling heads, as well as transverse and vertical screw adjustments. With this new feature, the Nichols Twin Mill provides **Six-Way Adjustability for Each Milling Head in Seconds.**

Adaptable for long or short-run jobs. The scope of Nichols Twin Mill utility is limited only by the imagination of the user.

THINK: Two geared milling heads—each completely independent with independent drives, push button controlled. Wide range of spindle speeds—55 to 2050 R.P.M. Vertical Head available for either or both spindles. Automatic Table cycle with rapid approach, hydraulic-controlled variable cutting feed and rapid return.

THIS MEANS: The Milling Heads may be directly opposed or offset longitudinally, vertically or transversally. Ferrous or non-ferrous materials can be milled with HSS or carbide tipped cutters. IT ALL ADDS UP to top production with fine finish while TOLERANCES TO TENTHS are maintained with ease.

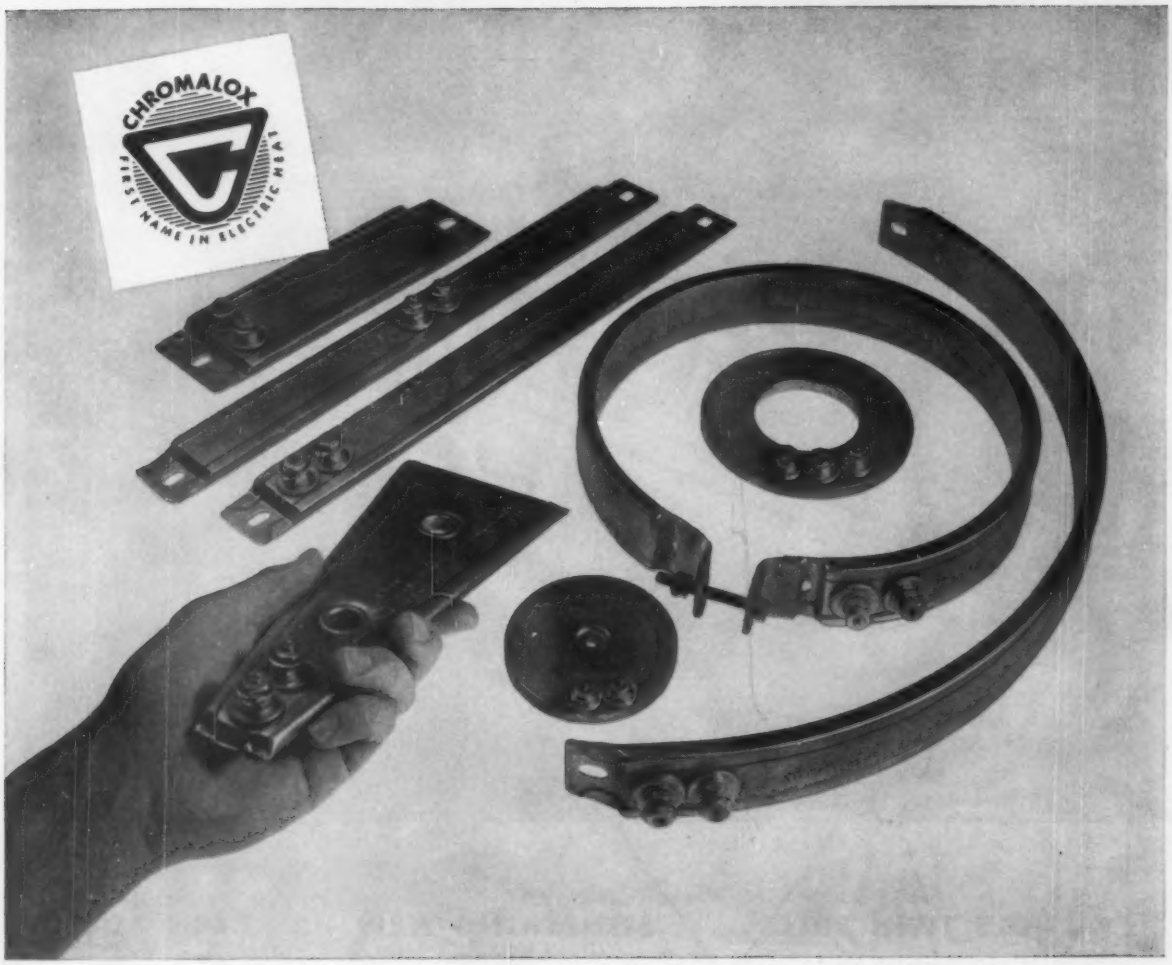
Complex light milling jobs can be milled faster and more economically with the Nichols Twin Mill. "Two Heads are better than one—for sure".

WRITE OR PHONE FOR FULL DETAILS—CATALOG.

MANUFACTURED BY W. H. NICHOLS COMPANY

NATIONAL DISTRIBUTORS THE ROBERT E. MORRIS COMPANY

5000 FARMINGTON AVENUE • WEST HARTFORD 7, CONN.



industry's most versatile heat source . . . Chromalox Electric Strip Heaters

Chromalox Electric Strip Heaters provide uniform, precise heat to fit the size and shape of your production equipment. For heating platens, dies, kettles, tanks, pipes, ovens, air ducts . . . there's a Chromalox Electric Strip Heater to provide the many advantages obtained only with electric heat. Low initial cost; quick, easy installation with standard bolts or clamps; long, maintenance-free heater life at low operating cost. Instant heat-up. Accurately maintained temperatures on each machine, by either automatic or manual control.

For the full story on Chromalox Electric Strip Heaters, call your Chromalox Representative, or, write today for Bulletin F1566.

Edwin L. Wiegand Company
7577 Thomas Boulevard, Pittsburgh 8, Pa.

B-718A

Standard stock elements for immediate delivery

Lengths—4" to 96" Widths—¾" to 2½"
Ring diameters—2½" to 11"
115 to 480 volts 35 to 5000 watts

Sheath materials—rust-resisting iron, high temperature chrome steel or Monel.

For clamping to pipes, tanks and other curved surfaces, you may specify either cross-section curving or lengthwise bending.

Terminals may be positioned to meet your operating requirements.

By addition of secondary insulating bushings, heaters may be connected in series, where voltage is above 480 volts.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-swing PEOPLE" SENECA FALLS, NEW YORK

NEW PLATEN-TYPE AUTOMATIC LATHES CUT BORING, FACING AND TURNING COSTS

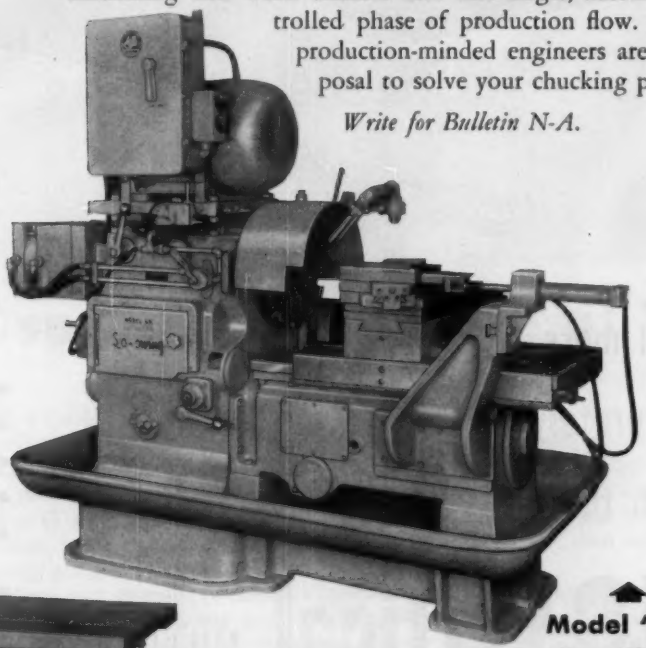
Model "N"
Swing Over Platen . . . 11"
H. P. Capacity 5

The NEW Seneca Falls Platen Type Automatic Lathes have been designed principally as chucking machines adaptable to a wide variety of work requiring large swing capacity, high spindle speeds, multiple tooling and fast cycling operation.

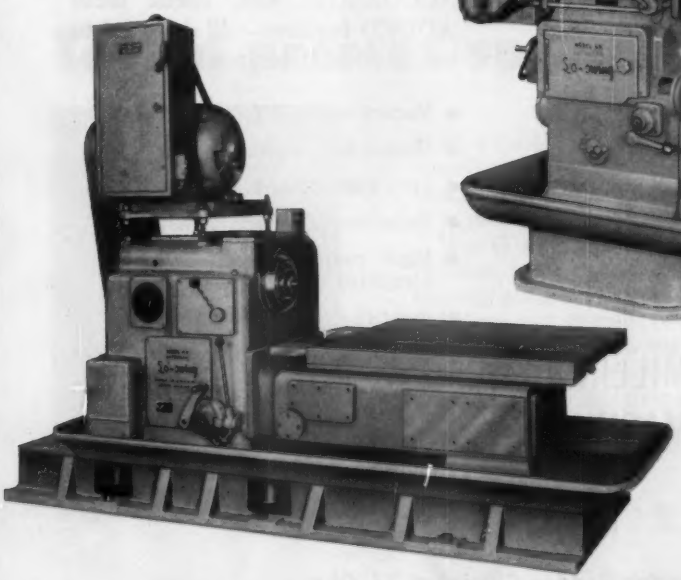
The platens have cam operated longitudinal and cross feeds and may be equipped with angular feeding slides and other special attachments suitable for customer's work.

All three types of machines may be equipped with Seneca Falls Automatic Loading and Transfer Equipment which provides means to extend automaticity to individual machines or through a series of successive, though dissimilar, operations to combine work loading, machining and work transfer into one single, automatically controlled phase of production flow. Seneca Falls production-minded engineers are at your disposal to solve your chucking problems.

Write for Bulletin N-A.



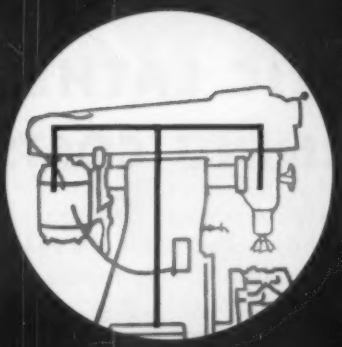
Model "LN"
Swing Over Platen . . . 18"
H. P. Capacity 20



Model "AN"
Swing Over Platen . . . 24"
H. P. Capacity 40

SENECA FALLS PLATEN-TYPE, CAM-OPERATED AUTOMATIC LATHES

BALANCED RIGIDITY

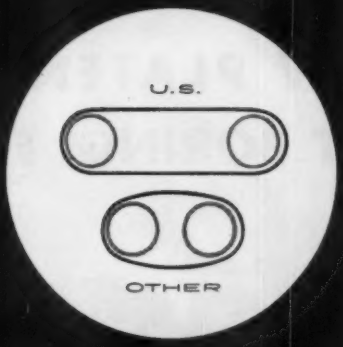


Motor mounted behind column balances weight of head, minimizes deflection.

ISOLATION OF MOTOR VIBRATION

Column acts as baffle, keeping motor vibration away from head.

MORE EFFICIENT POWER TRANSMISSION



Wide belt spacing permits use of B-section V-belt, more wrap-around on pulleys.

mill more accurately with the

U.S. Vertical MILLING MACHINE

The *exclusive* motor mount design of the U. S. Vertical provides balance, rigidity and greater milling ACCURACY! And, check these ADDED features — all designed to aid in close tolerance work.

- Machine weighs 2000 lbs.
- Massive knee, saddle and table
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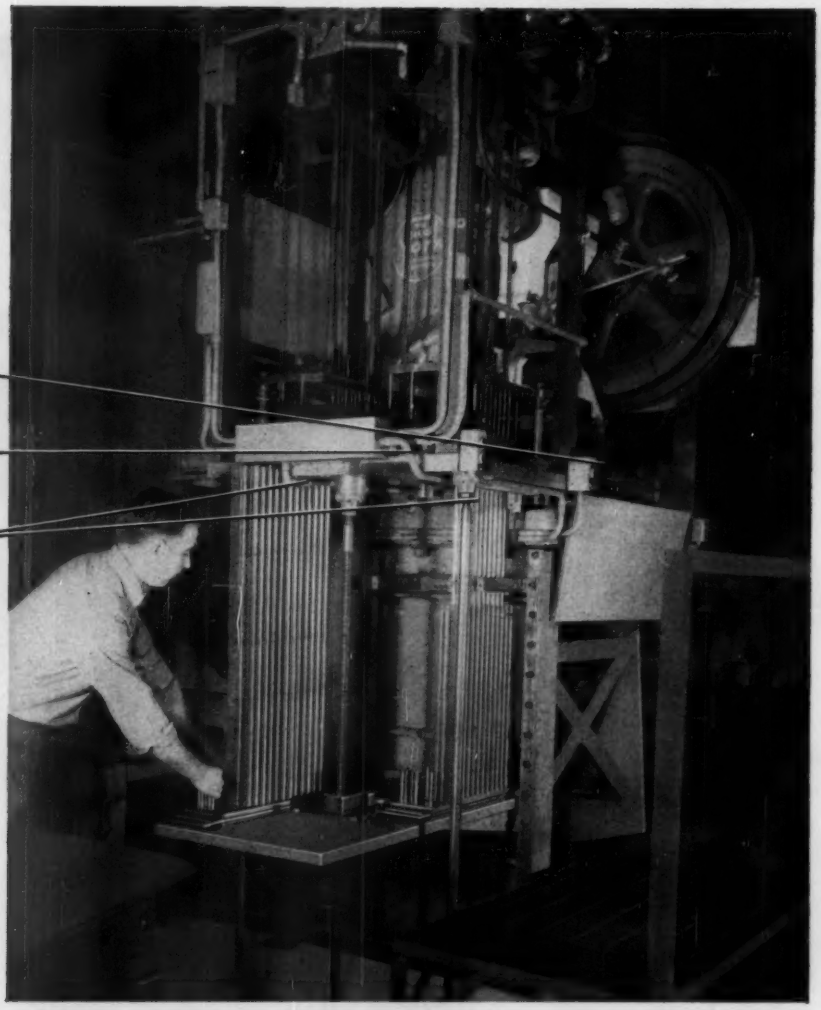
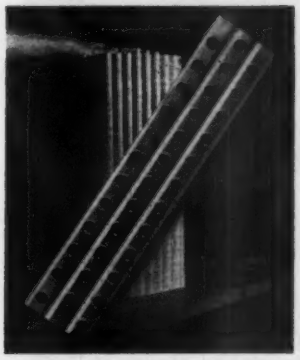


Tooled presses save assembly time at York



Aluminum fins (.006" or .008" gauge) are fabricated and stacked at rates up to 180 per minute.

York Division of Borg-Warner, wanted to combine a fabricating and assembly operation in the production of fin coils for air conditioning and refrigeration systems. *Objective: eliminate a time-consuming manual stacking operation that, in a period of expanding production, would grow increasingly expensive.*

V & O supplied equipped presses for the job. Fins, complete with skip-corrugation, holes and spacers, are made in a two-station die; then collected in a stacking mechanism and pushed down onto tubes.

Presses that integrate or combine operations are the primary business of V&O. Our long-slide presses are designed for automation. Our engineering is geared for it. We would welcome a chance to go over the possibilities of using mechanized presses to integrate or combine operations in your plant. Please write or call us.

THE V & O PRESS COMPANY

DIVISION OF EMHART MFG. CO.

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Presses and methods that automatically reduce costs

Paul DeKoning, President of Jantzen, Inc., says:

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"But I've got to! Top-fashion Jantzen swimsuits are rushed to the stores in mid-winter to beat competition for cruise and resort wear.

"Speed is essential. The styles that catch on are followed by big re-orders.

"To meet the demand – before our competitors do – we rely on Air Express!

"Our swimsuit factory here in Portland, Oregon uses Air Express to ship all over the country. Air Express never fails us.

"Air Express is using radio-controlled trucks to hustle shipments on the ground to and from airports. And any shipment can be instantly traced by the new Air Express private teletype system.

"Yet, we save money by specifying Air Express. For instance, a 10 lb. shipment from Portland, Oregon to Kansas City, Missouri costs $6.66. That's 57¢ less than any other complete air service."

Air Express

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here's how Seeburg matches P-K® fasteners to the job

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"By carefully selecting the right P-K screw for each assembly we've reduced rejects and stepped-up production," says Joseph Kamys, engineer of J. P. Seeburg, manufacturers of the famous line of Select-O-Matic "200" Coin Operated Phonographs.

◂ "Take the fastening of metal kickplates and base moldings to wood cabinets, for example. They must hold permanently and go in fast without splitting the wood. P-K Type-A Self-tapping Screws are just right for the job."

"In a metal-to-plastic application such ▸ as the fastening of high-frequency speakers to formed plastic housings—P-K Type-Z thread-forming Screws go in right without cracking the plastic—stay put, even under high vibration."

◂ "In this important subassembly, appearance is important as well as dependable holding power. Here we use P-K Type-A Phillips Recessed Head Screws in a metal-to-metal application."

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fasteners

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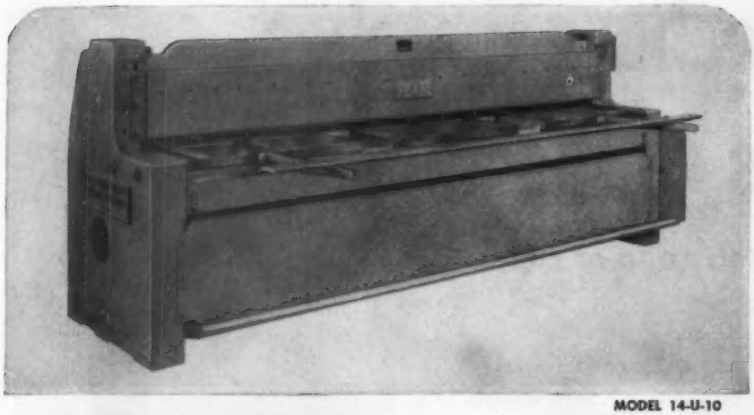
***PARKER-KALON DIVISION,** General American Transportation Corporation. Factory: Clifton, New Jersey.*



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New features . . . superb performance . . . quality engineered with self compensating holdown for fast, accurate, clean-cut, safe shearing of light gage sheet steel, stainless, plastic, fibreboard, etc. Included in the design are all refinements of modern gauging, maximum cutting life of each of 4 edges of the knives, single or repeat clutch control, protection against scrap damage and complete safety guards. New Bulletin No. 57 on request.

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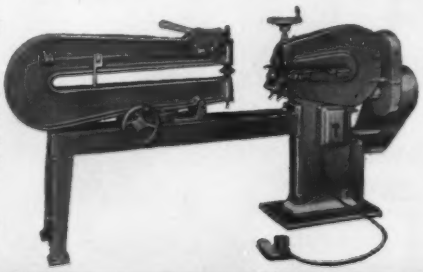
Improved machine cuts discs from square sheet metal, fibreboard, plastic blanks. Also cuts on inside of sheet for rings and gaskets.

Also complete line of machines and tools for sheet metal work.



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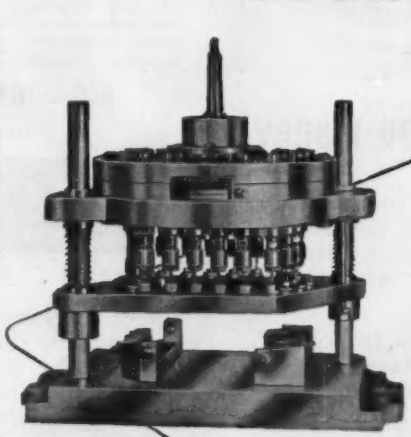
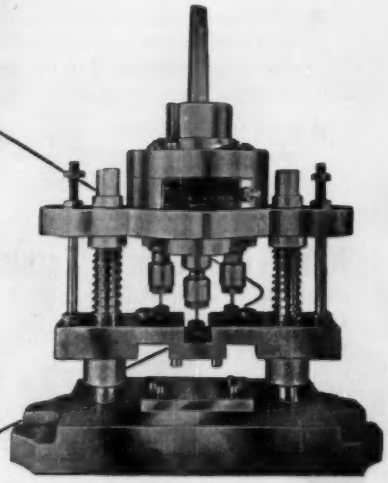
FIXED CENTER DRILLING HEADS with JIGS and FIXTURES



Custom Built to Your Specifications. Send Blueprint for Quotation Without Obligation.

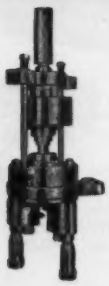


Do more . . . and do it better with Errington Fixed Center Drilling Heads. They drill any number of varied size holes on different elevations. The head has grooved thrust ball bearings at all thrust points and hardened bronze radial bearings. Heat treated spindles and gears, of one piece turned from solid bar stock. It is geared approximately 2:1. All enclosed in a sand-cast aluminum case and cover, with alemite pressure lubrication.

Send for Complete Catalog

FULLY ADJUSTABLE DRILLING HEAD

Here's a light, compact tool with a wide range of adjustment. Can drill on squares, rectangles, circles, triangles and irregular patterns.



ADJUSTABLE TAPPING HEAD

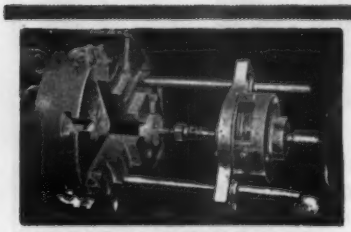
Fully geared. Needle bearings on all spindles in head. Ball thrust bearings throughout. Bronze bushed. Sand cast aluminum case.

ADJUSTABLE DRILLING HEAD

This versatile tool permits you to take advantage of a wide range of adjustment without overhang.

UNIVERSAL JOINT DRILLING HEAD

This dependable tool is adjustable to any pattern of holes. Available with 4 to 12 spindles. All aluminum housing construction, thrust bearings and gears turned on spindles.



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A new tool, practical, time-saving, money-saving. In a turret lathe setup it allows you to tap the hole and back out the tap without stopping the work or reversing the machine.

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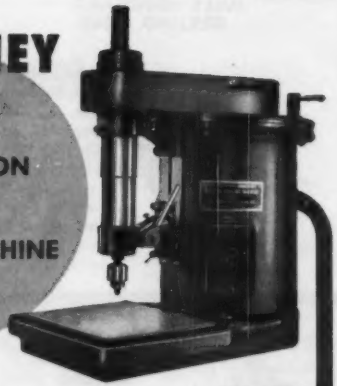
the PRECISION BENCH DRILLING MACHINE



No ordinary bench drilling machine, but an extremely accurate, high speed, sensitive machine for precision drilling. Drills from ¼" down to extremely small sizes. Successfully used down as far as .008".

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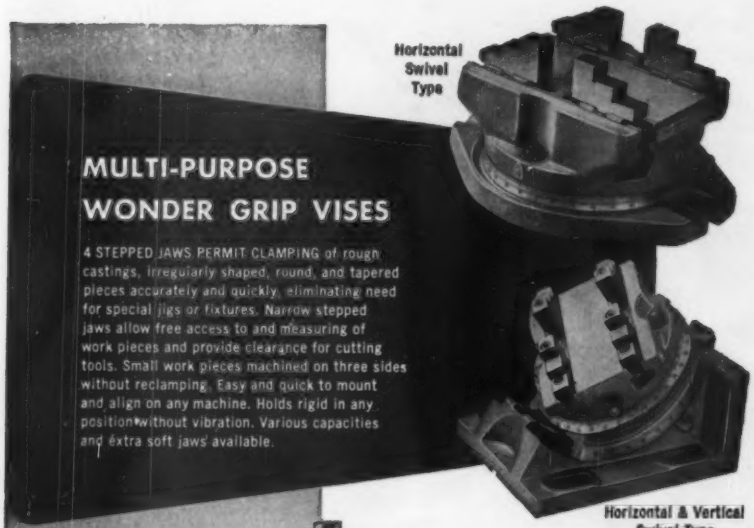

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4 STEPPED JAWS PERMIT CLAMPING of rough castings, irregularly shaped, round, and tapered pieces accurately and quickly, eliminating need for special jigs or fixtures. Narrow stepped jaws allow free access to and measuring of work pieces and provide clearance for cutting tools. Small work pieces machined on three sides without reclamping. Easy and quick to mount and align on any machine. Holds rigid in any position without vibration. Various capacities and extra soft jaws available.

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IMPACT OF SUPERALLOYS ON MACHINING METHODS AND EQUIPMENT

Here is a summary of the findings of a study made for the Air Research & Development Command of the Air Force entitled "Will Superalloys Set Production Rates Back 25 Years?" reprinted from American Machinist's August 13, 1956 issue. Address:

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American Society of Tool Engineers

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► **Solves your design problems quickly and effectively!**

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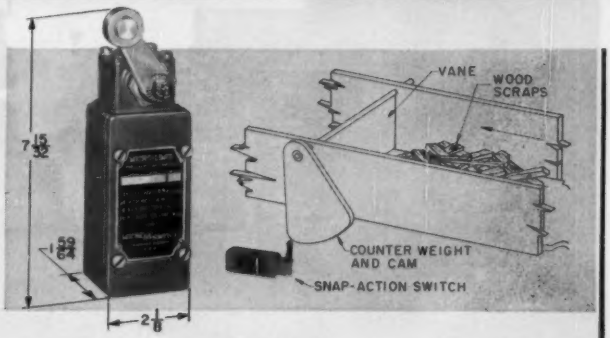
MICRO SWITCH . . . FIRST IN PRECISION SWITCHING

MICRO SWITCH "ML" Switch is control limit to avoid conveyor jams

This conveyor system was designed to carry off wood scraps. A vane is constructed in the conveyor line so that material passing down the line presses against the vane in case of a jam-up. The vane is counterweighted by a sector cam made of heavy steel plate. When the lowering of the cam operates the "ML" switch, the conveyor line shuts down. The "ML" switch was selected because it is sealed against weather and permits a 60° overtravel.

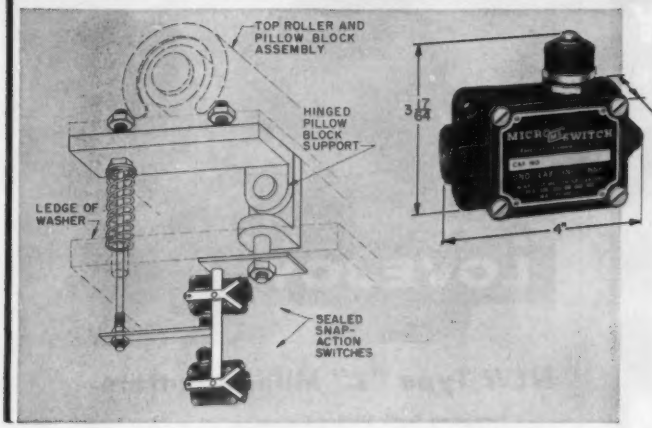


MICRO SWITCH "ML" switches combine rugged construction with precise operation. Both single and two-circuit switching units are available. Electrical rating is 20 amperes 120, 240, 480 volts, ac ; ½ ampere 115 volts dc ; ¼ ampere 230 volts dc ; ¾ H.P. 110 volts ac ; 1½ H.P. 220 volts ac.

How to make your production dollar go farther—with

MICRO SWITCH

PRECISION SWITCHES

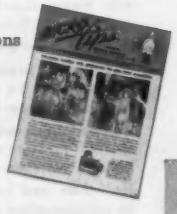


Tension kept within limits by spring lever working between two switches

Fabric tension in a bleaching and dyeing machine is kept from becoming too great or too slack by the use of two MICRO SWITCH "F" switches. The switches are positioned to stop the machine in the event the material passing through the top roller becomes too tight or too loose. Slackening of the cloth brings the lever against the upper switch. Excessive tension releases the springs and the bottom switch is actuated. The Type "F" switches were selected because of their dependability and their sealed protection against moisture and dirt.

MICRO SWITCH "F" switches are long-lived precision switches with the capacity for making and breaking steady state currents of 20 amperes and switching inrush currents as high as 75 amperes.

There are thousands of applications for MICRO SWITCH switches on plant equipment. For additional information on how to use MICRO SWITCH precision switches, let us send you MICRO Tips Digest—a gold mine of profit-making suggestions.



MICRO SWITCH distributors with full stocks of switches for every plant use requirement are located near you. Look under "Switches, Electric" in the Yellow Pages.

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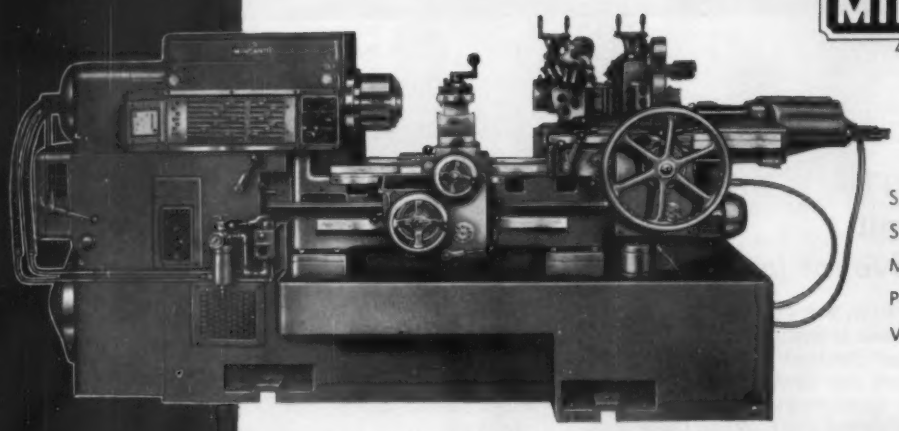

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Power	HP 8
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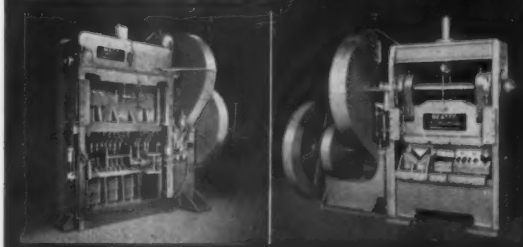

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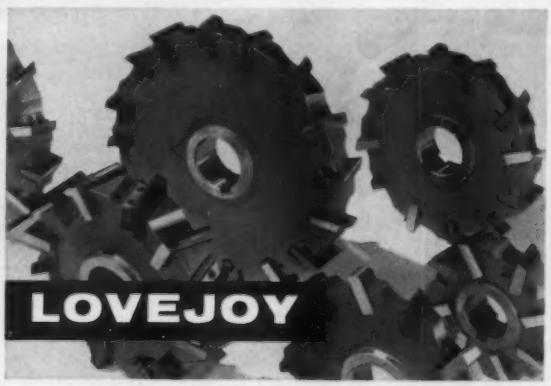

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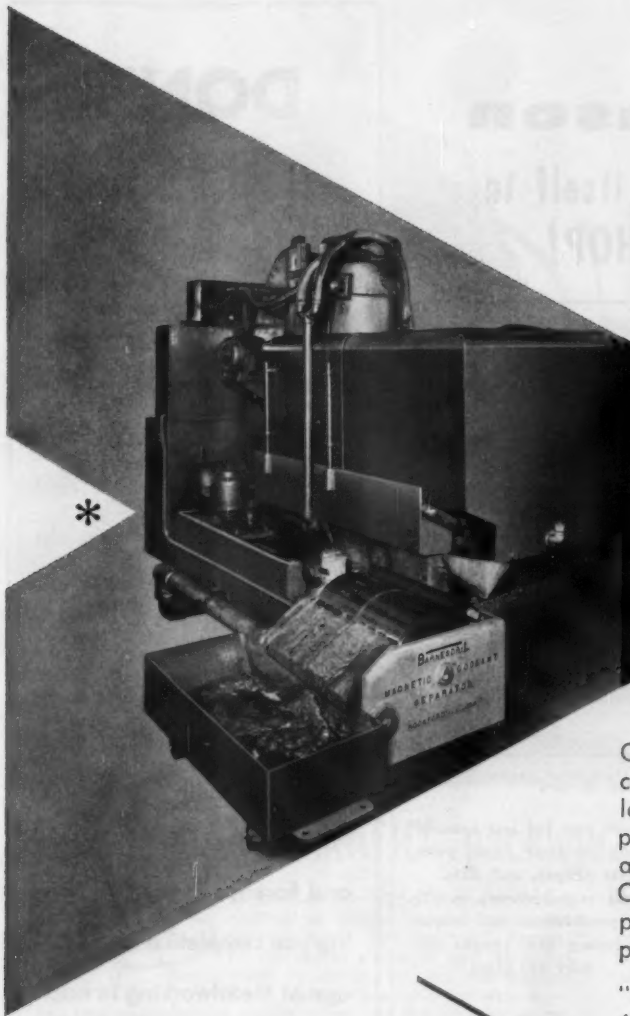

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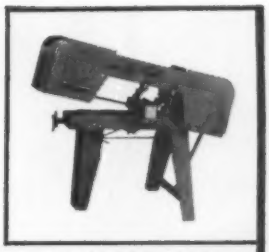

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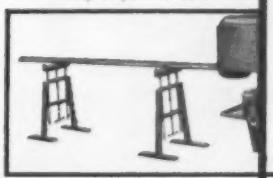

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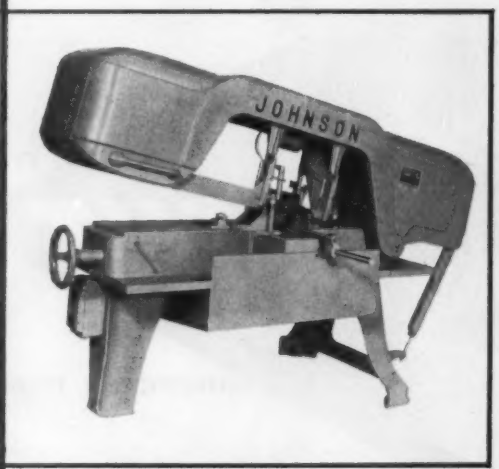

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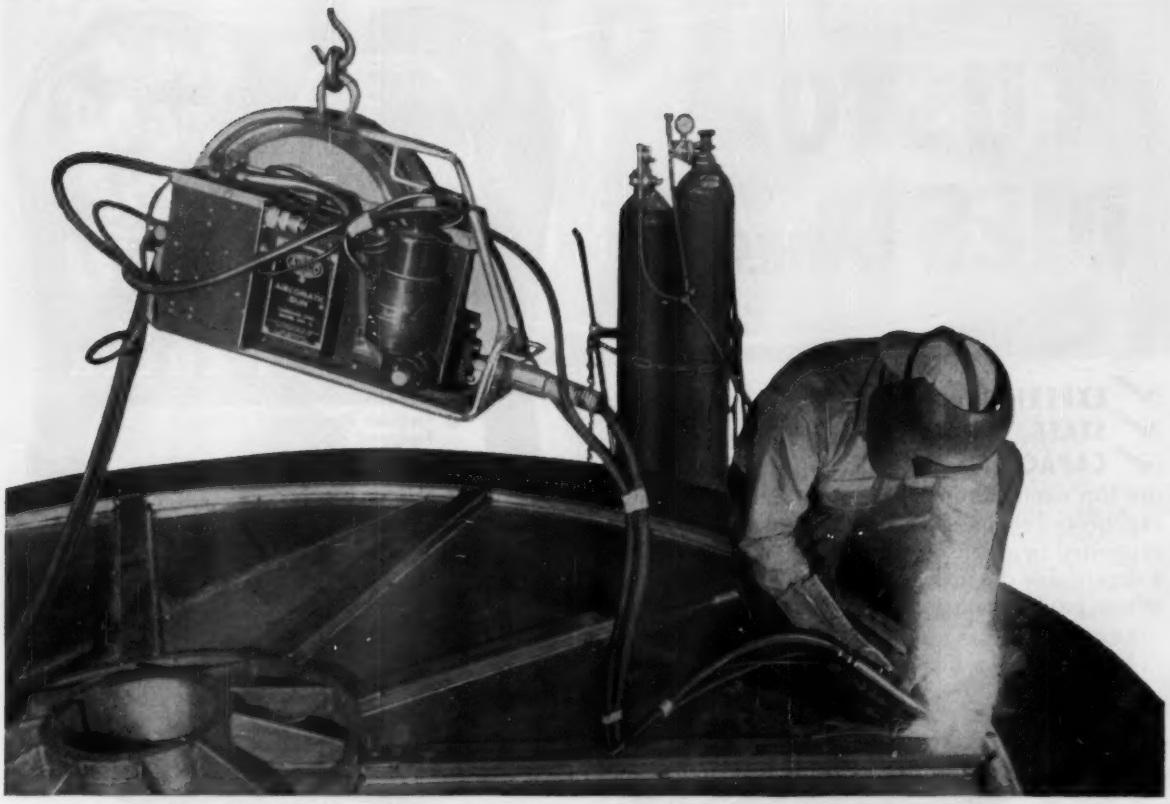

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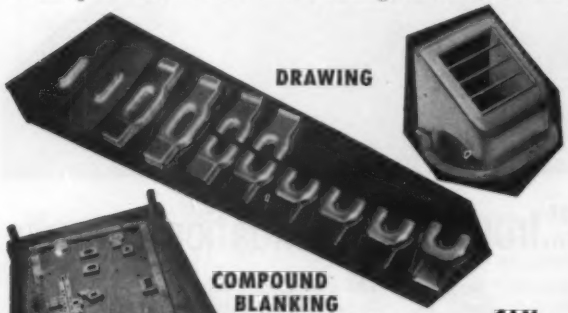

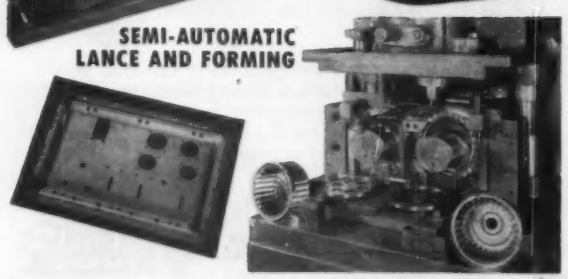

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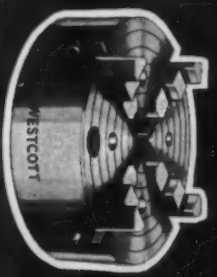

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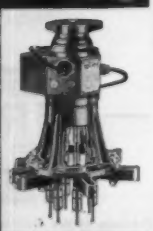

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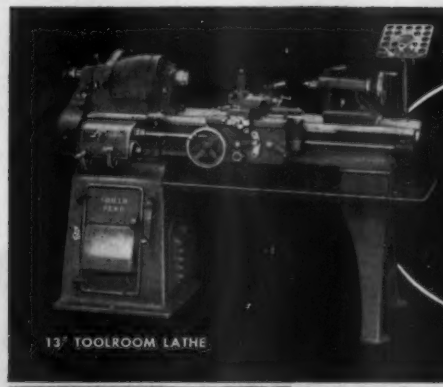

13" TOOLROOM LATHE

SOUTH BEND 13" LATHES

Illustrated — 13" x 5' bed Toolroom Lathe, less motor and controls, f.o.b. factory. $2139

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South Bend 13" Lathes are popular where there is a variety of precision parts to be machined. Costs drop as their accuracy and efficiency keep production flowing fast even on the "headache" jobs. Operators prefer them for their simplicity and practically effortless handling. Also, set-ups and change-overs are made so quickly and easily that down-time is held to a minimum.

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Collet Capacity—1" maximum (collets interchangeable with 10"-1", 14½", 16" and 16-24" South Bend lathes).

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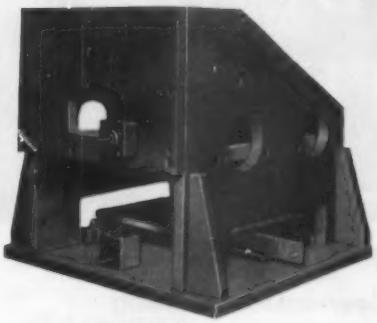

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What's Ahead? . . . see Page 2

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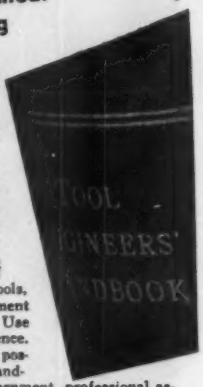

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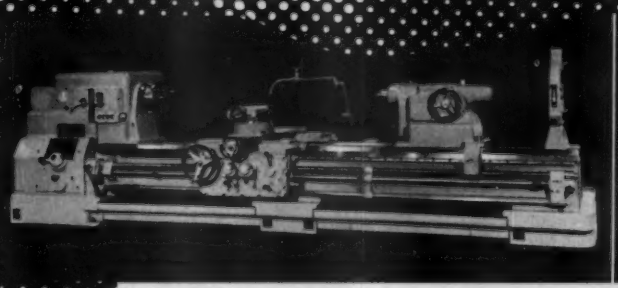
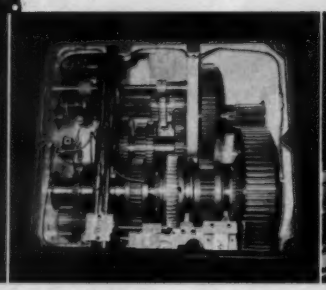
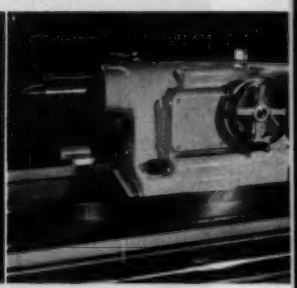
Axelson's 4025 Heavy-Duty Lathe is packed with the power, speed and rigidity you need . . . for today's carbides, for the ceramics of tomorrow. Put it to work on your team. Write for Bulletin AM-263.







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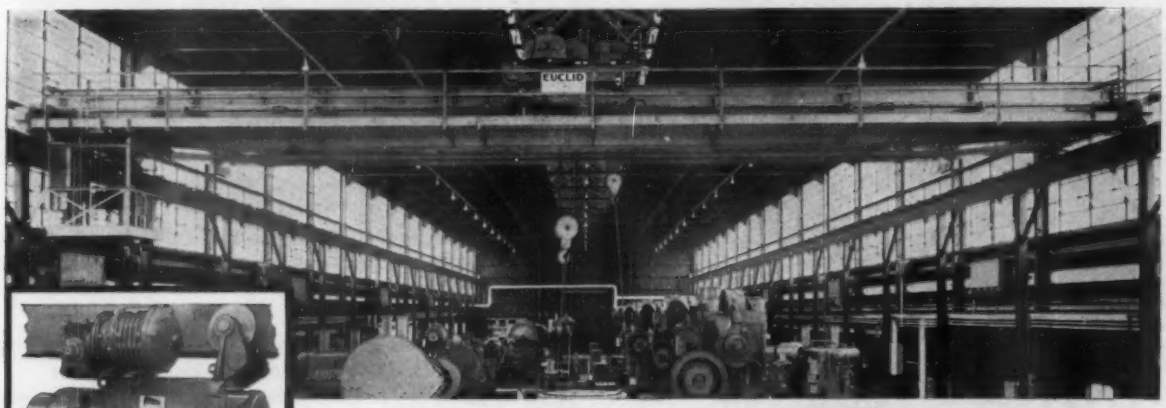

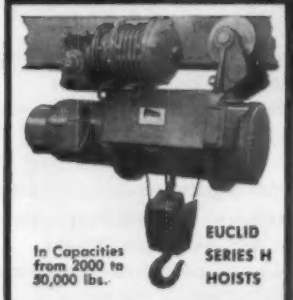

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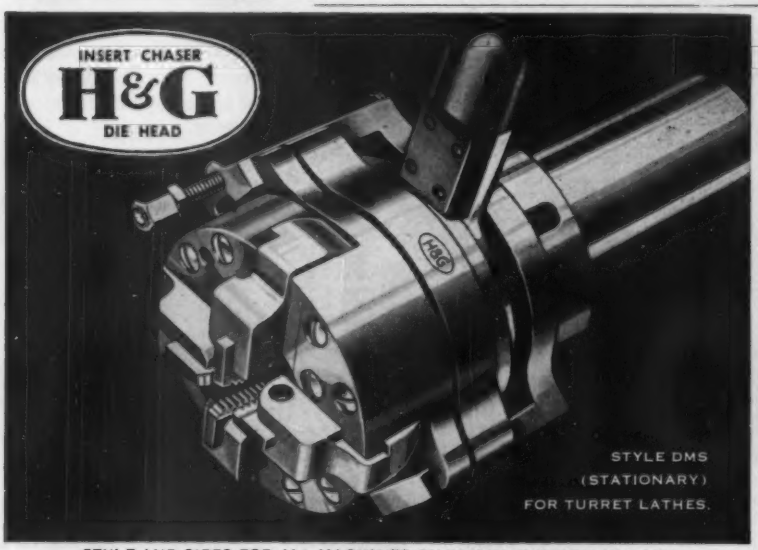


STYLE DMS (STATIONARY) FOR TURRET LATHES.

STYLE AND SIZES FOR ALL MACHINES ON WHICH THREADS ARE CUT

This die head is unique

THERE IS NO OTHER LIKE IT

It cuts threads with insert chasers. These are, in reality, small sections of the business end of large and expensive chasers, but with this important difference: *their cost is so low they can be even thrown away when dull.* For example, for less than $45 you can get a dozen sets of insert chasers, each set ground ready to go. Change now to insert chaser die heads and watch your performance improve. **"UNIFIED AND AMERICAN SCREW THREAD DIGEST" sent free on request.**

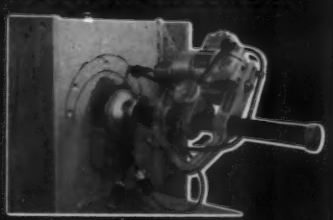
THE EASTERN MACHINE SCREW CORPORATION 20-40 Barclay St., New Haven, Conn.

ONLY

MAG-TOOL

HAS

MICROMATIC ADJUSTMENT



MAG-TOOL Drill Presses attach magnetically to ferrous surfaces bringing the capacity of heavy duty presses right to the job!

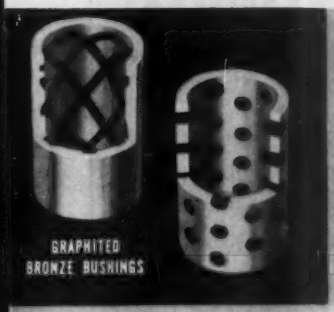
MICROMATIC ADJUSTMENT enables movement of the drill for precise positioning *after* the press has been attached to the working surface. For example, (see photo) the bit may be easily positioned anywhere between the two curved lines without moving the drill press.

Inquiries invited.

MAGNETIC TOOL CORPORATION

1955 Lafayette St. Santa Clara, Calif.

Randall Bronze Sleeve Bearings and Assemblies...

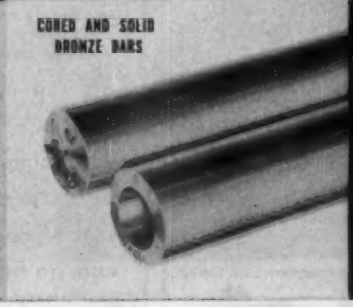

GRAPHITED BRONZE BUSHINGS

TWO-PIECE CAST IRON PILLOW BLOCKS

STANDARD BRONZE BUSHINGS

BEARING BRACKET ASSEMBLY

STEEL HOUSING FLANGE UNIT


CORED AND SOLID BRONZE BARS

DUPLEX BEARING ASSEMBLY

ONE PIECE STEEL HOUSING PILLOW BLOCKS

your assurance of longer bearing life and reduced maintenance

Pioneering in graphited cast bronze bearings, Randall products lead in sleeve bearing applications. Advanced foundry and machining practice—coupled with a planned research program—have enabled Randall to keep abreast of new designs and developments. Leading manufacturers in all types of industry are realizing the advantages of making Randall their primary source for sleeve bearings.

RANDALL PILLOW BLOCKS

Randall's "DEEP-WELL"® trade-mark has become synonymous with quality, efficient and low-cost sleeve bearing Pillow Blocks. Methods of lubricating Randall Bearings are consistent with proven engineering theories—by maintaining an unbroken hydrodynamic oil film in the bearing area, metal-to-metal contact is avoided and exceptionally long life is obtained. The "DEEP-WELL"® reservoir automatically feeds lubricant to all parts of the bearing surface through porous graphite feed plugs and grooves. Randall Pillow Blocks may be modified for unusual conditions and adapted to many different styles and types of lubrication. Randall Pillow Blocks in smaller shaft sizes are available with sintered bronze bushings for light duty applications.

RANDALL BRONZE

More than 800 sizes of Randall standard bushings and over 400 sizes of Randall cored and solid bronze bars are available from stock. Special bushings to specifications furnished with a minimum of lead time. Randall's graphited bearings, in many styles, are well known to the trade. Compounded by an exclusive formula, the Randall graphite mixture will not chip, flake, crack or wash away under normal conditions. A Short Order Department is maintained to produce bearings on an emergency basis.

Randall has an excellent record for maintaining promised deliveries with quality bearings. Contact your nearby Randall distributor today. He's listed in the yellow pages of the telephone directory under "Bearings." LOOK TO RANDALL FOR YOUR SLEEVE BEARING REQUIREMENTS.

Randall
SINCE 1906

USE THIS COUPON TO SEND FOR LITERATURE

Clip this coupon to your letterhead, include your name and department and send it to Randall Graphite Bearings, Inc. We will send you the complete Randall ☐ Pillow Block and/or ☐ Bronze Bushing Catalogs. Please check your interest.

RANDALL GRAPHITE BEARINGS, INC.

1018 South Greenlawn Avenue, Lima, Ohio

RGS

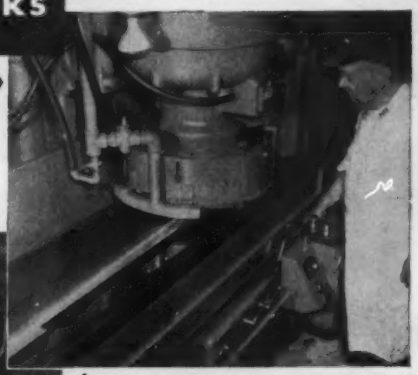
HOW TO CUT
SET-UP TIME
WITH
Sundstrand
Magnetic Chucks

Here are two more examples of the profitable application of Sundstrand magnetic chucks to grinding operations. Similar, profitable applications have been made to milling jobs.

No matter how you are holding work pieces now, in grinding and milling, talk to a Sundstrand engineer. There is no obligation for this service.

SET-UP TIME CUT 30%

12"x96" transverse pole magnetic table on vertical spindle grinder holds various sizes of H.S.S. broaching tools at an average savings in set-up time of 30% over former method.



SET-UP TIME CUT 20%

Four 10"x40" POWER-GRIP Chucks on a 24"x96" horizontal spindle surface grinder hold ways, way caps, valve plates, broach holders etc. The four chucks can be operated individually or as one complete unit. Set-up time averages 20% less than previous method.

GET MORE FACTS

Write for further information on holding work for both grinding and milling operations.
Bulletin 177-M

SUNDSTRAND POWER-GRIP

SUNDSTRAND
Magnetic Products Co.
Division of Sundstrand Machine Tool Co.
1020-9th ST. • ROCKFORD, ILLINOIS

WANT TO TOOL WITH PLASTICS?

American Machinist's Special Report Number 410 outlines the plastics most widely used; the new materials now available; and the new toolmaking techniques that are being developed. Case histories illustrate current applications of these methods in Metalworking. Send 25¢ and your name and address to:

Reader Service Department
AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

SAVE VALUABLE ALUMINUM!

Cutbacks of aluminum for civilian consumption, and its importance in defense production, increase the necessity of economical and efficient methods for working this widely used non-ferrous metal. The *American Machinist* Special Report, "How to Work Aluminum and its Alloys," explains what you can do to make your supply of aluminum go further.

This valuable 16-page article is a summary of the latest developments in fabricating this vital metal . . . the characteristics of aluminum alloys . . . machining methods . . . sheet-working methods . . . casting and forging . . . joining methods . . . cleaning and finishing. Reprints of this timely article are available at only 25 cents per copy.

Write Reader
Service Department:

American Machinist
McGraw-Hill Building
New York 36, N. Y.

Fewer Disc Changes—"*More Use per Dollar*" MANHATTAN MOLDISCS

Every turn of a Manhattan Moldisc exposes a fresh, sharp abrasive surface—right down to the last usable part of the wheel. It won't load or glaze, whether the job calls for roughing *or* finishing . . . on weldings, castings *or* forgings. No wonder tests prove Manhattan Moldiscs are the most economical portable grinding wheels you can use on right angle grinders.

Manhattan Moldiscs are custom-made to meet your particular grinding and cutting requirements . . . for smoothing weldments, removing burrs, beveling edges on mild steels, stainless alloys, copper and aluminum. They're safer to use because they're light in weight, easy to control—and reinforced with special super-strength industrial fabric to prevent breakage.

Manhattan Moldiscs are available in a range of types from harder, stiffer bonds for fast roughing to more flexible and resilient bonds for fine finishing operations. Ask a Manhattan representative about Manhattan Moldiscs and other Manhattan high speed, heavy duty abrasive wheels for your operations. *Wherever* you need fast, safe metal removal and longer wheel life, you'll get "More Use per Dollar" when you specify *Manhattan*.

RM-739

GRINDING WHEEL INSTITUTE MEMBER

WRITE TO THE ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

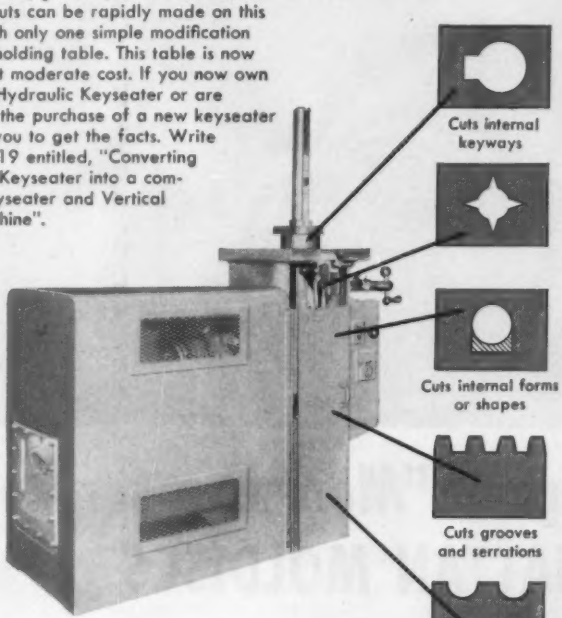
RAYBESTOS-MANHATTAN, INC.

Belts • Hose • Roll Covering • Tank Linings • Industrial Rubber Specialties • Abrasive and Diamond Wheels • Brake Blocks and Linings • Clutch Facings • Asbestos Textiles • Mechanical Packings • Engineered Plastics • Sintered Metal Products • Industrial Adhesives • Laundry Pads and Covers • Bowling Balls

TRIPLE THE USEFULNESS OF YOUR M&M KEYSEATER AND VERTICAL CUTTING MACHINE

Simple modification greatly increases productive capacity of this versatile machine.

An M & M Hydraulic Keyseater is not only a keyseater that cuts internal keyways up to 5" wide but a vertical cutting machine as well. Serrations, grooves, teeth—a wide variety of cuts can be rapidly made on this machine with only one simple modification — a work-holding table. This table is now available at moderate cost. If you now own an M & M Hydraulic Keyseater or are considering the purchase of a new keyseater it will pay you to get the facts. Write for Bulletin 19 entitled, "Converting the M & M Keyseater into a combination Keyseater and Vertical Cutting Machine".



M&M KEYSEATERS AND VERTICAL CUTTING MACHINES

98

MITTS & MERRILL • 104 Holden Street • SAGINAW, MICHIGAN

Handle your small part precision JIG BORING on the LINLEY JIG BORER

Why tie up your big, costly pig borers on small work when you can get maximum utility at less cost per hour on a machine exactly fitted to your work? Put your small work on the LINLEY where it belongs and reserve your large machines for large work, *where large work belongs*. You'll save money this way.

SPECIFICATIONS

Table Movement: 6" x 10" — Table Size: 7" x 17½"

Complete details sent promptly on request

LINLEY BROTHERS CO.

664 STATE ST. EXT., BRIDGEPORT 1, CONN.

DON'T GIVE UP!

—ON THAT TOUGH METAL-CUTTING PROBLEM!

USE HKP® PORTER CUTTERS

JUST CAN'T BE BEATEN . . .

If it's a "hard-to-figure-how", metal-cutting job, — there is a PORTER CUTTER that can handle it for you, with amazing speed, and lowest possible cost. In the versatile PORTER line there are 108 different hand-powered cutters, each one designed to do a particular job, or jobs — to cut some type or size or shape of metal fast and cheap, including BOLTS, RODS, SCREWS, RIVETS, WIRE, CHAIN, SOFT, MEDIUM AND HARD METALS, STEEL STRAPPING, and many others. These rugged cutters exert up to 20,000 pounds cutting pressure — make hard work easy, cut labor costs as much as 97%! Want profitable proof? Write for the PORTER catalog.

Illustrated above — is the famous PORTER CENTER-CUT CUTTER. The leading all-round cutter for industrial production. 8 sizes — up to ¾" capacity.

for "PRODUCTION" CUTTING

The PORTER WORK-STATION CUTTER — in 3 sizes — can increase the output of one man up to 300% in continuous volume cutting, up to ½" capacity.

for THOSE RUGGED JOBS!

PORTER HEAVY DUTY CUTTER

Cuts almost anything in metal — up to ¾" diameter — thanks to its heat-treated, heavy-forged straps, and hard-tempered, center-cut jaws. Available in 3 sizes.

WRITE FOR CATALOG

It should show you the way to the solution of your metal-cutting problem.

Contact your Industrial Distributor for Service

H. K. PORTER, Inc.

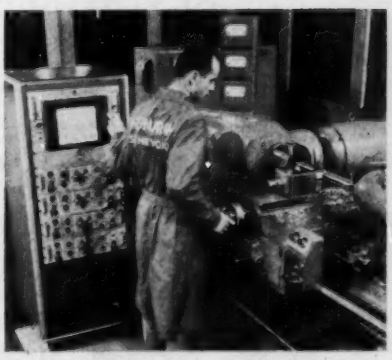
Somerville 43, Mass.

OUT FOR 22 MINUTES—

Seeing a "Technical Metal Working Film you'll never forget"

You are invited to view, in your own plant at a time of your own choosing, a sound moving picture that well may cause you to reconsider the whole approach to your metal turning processes. And we predict that you will wish to have it re-run, perhaps several times, for selected management, production and engineering personnel.

For the new Monarch film "When The Chips Are Down" is *not* a sales or a product demonstration film. It is a factual study of the progress of our Machinability and Development Laboratories. It is a report of their scientific attack on such turning problems as feed, speed, and tooling expressed in the obtaining of data on cutting tool forces, tool geometry, work distortion, and vibration; on chemical and metallurgical properties of metal; on shear properties; on cutting fluids. And it shows the practical applications of such research in improved design of lathes and lathe components. Also it makes possible a service to our customers whereby we help them achieve optimum cutting conditions, top quality and accuracy, highest production returns.



Special instrumentation applied to Monarch Machinability Test Lathe.

If you will just write us (Dept. A) on your business letterhead, we will gladly make arrangements for a viewing—without the slightest obligation. You might well find it the most rewarding twenty-two minutes of a busy day.

Monarch
TURNING MACHINES
ACCURACY • ECONOMY • LONG LIFE
FOR A GOOD TURN FASTER . . . TURN TO MONARCH

THE MONARCH MACHINE TOOL COMPANY
SIDNEY, OHIO

SERVICED COAST TO COAST

OVER 1000

MEASUREMENTS

IMMEDIATE DELIVERY FROM NEW YORK AND MONTREAL STOCKS

AUTOMATIC LUBRICATION TO HEADSTOCK QUICK CHANGE GEARBOX AND CARRIAGE

STANDARD ACCESSORIES

2, 3, or 4 H.P. 220-440/60/3 or 550/60/3 Motor and complete reversing electric equipment! Covered Ways!

Center Sleeve	2 Centres	Set of Spanners
Driving Plate	Oil Pan	Set of Hook-spanners
American Toolpost	Micrometric carriage stop for automatic release of carriage feeds	

EXTRA ACCESSORIES (OPTIONAL)

1 Universal 4 jaw indep. chuck	$100.00	Collet Closer	$120.00
8" or 10" three jaw self-centering chuck, fitted	120.00	20-extra collets ⅛ to 1-9/16" (Raising by 1/16")	200.00
8" or 10" four jaw self-centering chuck, fitted	120.00	Bar guide	46.00
Four way toolholder with sep. compound	100.00	Taper turning attachment	250.00
Live centre	35.00	Turret Tailstock, Hydraulic	600.00
Steady rest	60.00	Threading dial	25.00
Follow rest	50.00	Grinding attachment (external and internal)	210.00
Wet turning equipment, mounted	170.00	Milling attachment	130.00
Working place lamp, mounted	36.00	Relieving attachment	150.00

NEW BARER-MEUSER MACHINES ALREADY IN OPERATION IN THE U. S.

Swing over bed	**14"**	**16"**
Swing over cross slide	**8"**	**9½"**
Swing in gap (with removed bridge)	**21"**	**23"**
Width of bed	**11"**	**11"**
Width of gap (with removed bridge)	**10"**	**10"**
Length of gap in front of face plate	**8"**	**8"**
Hole in spindle	**1 9/16"**	**1 9/16"**

8 SPINDLE SPEEDS forward and reverse either 19-720 r.p.m. or 24-900 r.p.m. or 36-1400 r.p.m. or 42-1600 r.p.m.

2, 3, or 4 H.P. Motor (according to speed range).

Lead screw: 4 T.P.I. Morse Taper No. 3

Long Taper Key Drive Spindle Nose.

BED: 3 Vee Ways; 1 Flat Way.

30" and 40" distance between centres: 2 cabinet legs.

60" and 80" distance between centres: 3 cabinet legs.

THREADING RANGE . . .
(without change gears)

96—American threads 27/64 — 128 T.P.I.
64—Metric threads 0.375 — 64 mm
86—Diametral pitch 1 — 160 threads/ π inch.
32—Module threads 0.25 — 16 module

FEED RANGE . . .
REGULAR FEEDS:
42—Longitudinal feeds .0006" — .0248" per rev.
42—Cross feeds .0002" — .0075" per rev.

COARSE FEEDS:
42—Longitudinal feeds .0048" — .1984" per rev.
42—Cross feeds .0016" — .0600" per rev.

MACHINE COMPLETELY TO AMERICAN STANDARDS
ALL GRADUATIONS IN .001"

14" swing (21" swing in gap)

Swing	Centres	Weight	Price
14"	30"	lbs 2800	$2,750.00
14"	40"	lbs 3000	2,900.00
14"	60"	lbs 3200	3,100.00
14"	80"	lbs 3400	3,200.00

16" swing (23" swing in gap)

Swing	Centres	Weight	Price
16"	30"	lbs 3000	$3,000.00
16"	40"	lbs 3200	3,200.00
16"	60"	lbs 3400	3,400.00
16"	80"	lbs 3700	3,650.00

PRICES ARE F.O.B. NEW YORK, AMERICAN DUTY INCLUDED, OR F.O.B. MONTREAL, SALES TAX EXTRA

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Wondering who makes . . . BEARINGS? . . . GEARS?

. . . FASTENERS? . . . GRINDERS?

. . . or any of the 1001 operating items and machines you need?

Here's an up-to-date single volume buying guide and production aid—

AM's Production Planbook and Buyers' Guide Issue

New York—If you refer frequently or occasionally to the Buyers' Guide section of your 1957 Production Planbook and Buyers' Guide Issue published by AM in Mid-November, 1956, you are right in line with 93% of recently surveyed American Machinist subscribers.

Of those answering the question, 70.3% refer to the Buyers' Guide Section "occasionally" or an average of 2.5 times monthly; while another 21.7% use it "frequently" averaging 2.8 times per week. 88.7% of respondents state they refer to the advertising pages for product information.

Over 7000 Sources of Supply—1400-plus Headings

Typical listings in 107-page Buyer's Guide Section. Names of advertisers in the issue are shown in bold face with page numbers of advertisements, for easy reference by subscribers wanting full product information.

Readers' Comments

Many subscribers added comments to the questionnaires they returned. Samples:

"Your 1957 Production Planbook and Buyers' Guide issue is better this year than I ever saw before. It is very well arranged in all departments, and with the addition of the Buyers' Guide, it makes a good year 'round book and I am very proud to own it." *Plant Manager*

"We have found this 'Guide' very useful to an extent that it is our 'first source' when looking for information." *Superintendent*

"Your Buyers' Guide is of particular interest at this time as we are soon to move into a new plant with some new machines and tooling." *Production Control Supervisor.*

"A very informative publication that is extremely helpful especially in regard to the Buyers Guide Section. An up-to-date Section such as this is always of great value with the 'ever changing products and markets of today." *Factory Manager*

"Information contained in the issue pertaining to types of machine tools, general descriptive data as well as the manufacturer's identification and address often aids to expedite the gathering of initial ideas for further development." *Works Supervisor*

"Consider having advertisers take a page to list their distributors so buyers can find them and not accept substitutes." *Consultant*

"I find it very helpful as a source for new equipment such as valves, hydraulic cylinders, relays. Also as a reference for a source of material specified by customers when designing new projects." *Production Supervisor*

1958 Edition Now in Preparation

And here's good news: AM's *1958* Production Planbook and Buyers' Guide Issue will be published in *Mid-September, 1957,* to reach you just in time for Fall-Winter production planning.

You'll find 11 idea-stimulating sections treating everything you need to plan ahead for a high-production-level 1958—all wrapped up in a manageable, single volume, working reference issue.

Flat-opening, thumb-indexed and classified by topic, American Machinist's 1958 Production Planbook and Buyers' Guide Issue is easy to use and refer to throughout the year.

Exclusive Editorial Features

Production "Nuggets" — declared highly useful and enthusiastically endorsed by 4 out of 5 surveyed subscribers — are the essence of production ideas classified by subject matter, and, for ready reference by subscribers who want more specific details, drawings, and diagrams, issue dates and page numbers of the source are included.

***"Names in the 'Nuggets'"**—lists of the various trade names and company names appearing in the "Nuggets" sections to help you take quick action on production ideas stimulated by the "Nuggets."

"Developments to Watch in '58," found useful by 90.5% of surveyed subscribers, provides you with a handy check-list against which you may rate your shop procedures and requirements, as compared to the latest production ideas and techniques.

Manufacturers Free Literature — lists of helpful literature offered by manufacturers, classified by type, following each "Nugget" section.

A Year-'Round Ready Reference

All these features will appear in appropriate sections as shown at right—provide an additional, unique editorial service without extra charge to subscribers—make American Machinist's 1958 Production Planbook and Buyers' Guide Issue an authoritative, complete ready reference of

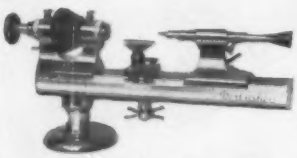
How-to-do-it
What-to-do-it-with
Where-to-buy-it

you will want to refer to the year 'round.

1958 OUTLOOK
MANAGEMENT, PERSONNEL A
MACHINING B
TOOLING C
PRESSWORKING, MOLDING, CASTING D
INSPECTION, TESTING, QUALITY CONTROL E
ASSEMBLY, HEAT-TREAT, FINISHING, (ASSEMBLY INCLUDES WELDING & PORTABLE TOOLS) F
MATERIALS, COMPONENTS G
MATERIALS HANDLING, SERVICES H
PRIZE IDEAS, REBUILT EQUIPMENT I
BUYERS' GUIDE J

Write for full details

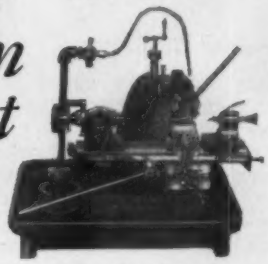
Derbyshire *fine precision equipment*

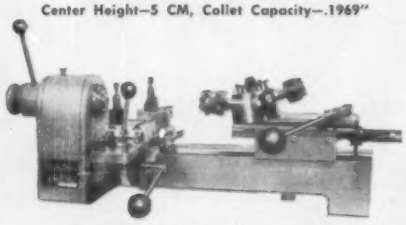


WEBSTER WHITCOMB 12" BED
Center Height—5 CM, Collet Capacity—.1969"

ELECT LATHE — 18" BED
Center Height—2.35" (6 CM)
Chuck Capacity—.004" to .315"

MICROMILL
2 Table Surfaces: 7⅞" x 2⅜" — 12" x 2⅜" — Takes Magnus Collets.

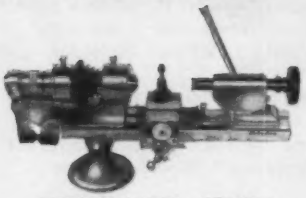




MODEL No. 750 — 22" BED
Center Height — 7.50 CM, Collet Capacity — .315"

If you have a problem . . .

. . . concerning small precision turning or milling, one of these lathes or the milling machine shown should solve it. Write for Catalog.



MAGNUS LATHE — 12" BED
Center Height — 5 CM
Collet Capacity — .315"

F. W. DERBYSHIRE, INC.
157 HIGH STREET
WALTHAM MASS.

FREE—New Bulletin T-1 shows, describes VAILL tube end forming machine VERSATILITY for . . .

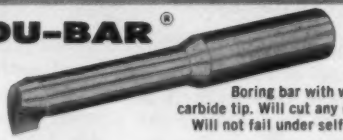
Beading • Flaring • Flanging • Sinking
Expanding • Grooving • Threading • Reducing
Double Lap Flaring • Double Lap Flanging

on Tubing up to 6"Diam.

THE VAILL ENGINEERING CO.
135 E. MAIN STREET WATERBURY 20, CONN.

WELDED CARBIDE-TIP TOOLS
for all hard metals, ceramics, glass and plastics

DU-BAR®



Boring bar with welded tungsten-carbide tip. Will cut any metal or plastic. Will not fail under self-generated heat.

DU-DRILL®

Drill with welded tungsten-carbide tip. Cuts anything between Rockwell C-38 and C-84. Will not anneal, burn or melt.

DU-BORE®

Counterbore with welded tungsten-carbide tip. Unaffected by highest cutting temperatures. Higher cutting speeds.

DU-MILL T.M.

End mill with welded tungsten-carbide tip. Mills ordinary metals at high speed plus hard metals, ceramics, glass and plastics.

Write for catalog sheets

COFFEY-CUMMINS MANUFACTURING CO.
[illegible] AVE.

now . . .

Carpenter e-x-t-e-n-d-s the built-in safety factor of STENTOR (oil-hard) tool and die steel!

Remarkable heat treating versatility found in no other oil-hardening, non-deforming tool steel, now assures extra cost-savings with Carpenter STENTOR (Oil-Hard). A broader, safe hardening range from 1425° F to 1525° F makes it possible to fit STENTOR tools and dies into many heat treating schedules during the average day.

Make your own evaluation. Add this extended built-in factor of safety to the other cost-saving advantages you get with STENTOR: easy machinability, less size change and distortion, uniform hardenability and freedom from decarb. Then call your local Carpenter Mill-Branch Warehouse, Office or Distributor for information and *rush delivery* on STENTOR with its extended built-in factor of safety.

Carpenter STEEL

matched tool and die steels

The Carpenter Steel Co., 109 W. Bern St., Reading, Pa.

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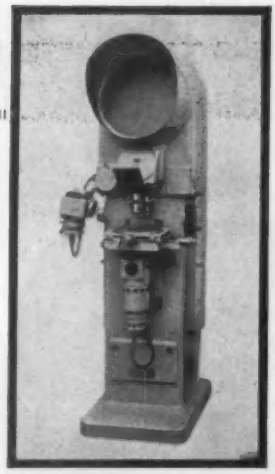
NIKON OPTICAL COMPARATOR, MODEL III



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LUCAS #43 Horiz. Precision; 4½" bar; Table type; 20' to outboard support; late type.
SELLERS 4" HORIZ.; Table type; late type.
BULLARD 24" Vertical Turret Lathe; Spiral drive; late type.
BULLARD 36" Vertical Turret Lathe; spiral drive; late type

BROACHES

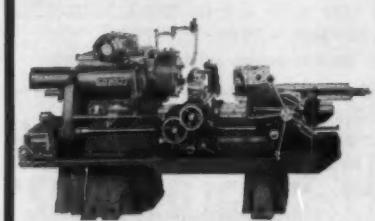
CINCINNATI No. 1-30 Vertical Duplex; hyd.; late type.
COLONIAL Model VG1 10-48 Vertical, Hyd.; late type
LaPOINTE Model SRV 10-54 Vertical Hyd., late type
LaPOINTE Model SRV 15-66 Vertical Hyd., late type

DRILLS, RADIAL

AMERICAN 4' arm 11" column; motor drive
AMERICAN 7' arm 16" column; motor drive
CINCINNATI BICKFORD 4' arm 11" column; motor drive
CINCINNATI BICKFORD 6' arm 15" column; motor drive
CINCINNATI BICKFORD 2½' arm 7½" column; motor drive
MORRIS 3' arm 11" column; late type

GEAR EQUIPMENT

BARBER COLMAN Type A Gear Hobber; cap. 12"x12"; 3 D.P.; late
BARBER COLMAN Type S Hobber; late type
BARBER COLMAN Type T Hobber; 12"x12" cap. 3 D.P.; late
BARBER COLMAN No. 17 Hobber; cap. 8"; 2½ D.P., M.D.
BILGRAM 6" Bevel Gear Generator; 1 D.P.; M.D.
BILGRAM 16" Bevel Gear Generator; 2 D.P.; M.D.
BROWN & SHARPE No. 13 Bevel Auto. Gear Cutter; M.D.
CINCINNATI No. 4 Auto. Gear Cutter; cap. 36"; 2½ D.P.; late type
CINCINNATI No. 6A Auto. Gear Cutter; cap. 72"; 1½ D.P.; late type
CROSS No. 40 Pointing & Chamfering; late type
CROSS No. 45 Gear Chamfering Machine; late type



GISHOLT No. 5 Universal Turret Lathe, late type.

DETROIT Type GG-35 Gear Grinder; late type
FELLOWS 13LS Gear Lapping Machine.
FELLOWS 6Z2 Gear Shaper; 35" cap.; late
FELLOWS 6IA, 10" cap.; high speed; late
FELLOWS 612—35" cap.; high speed; late
FELLOWS 645A3—18" cap.; high speed; late
FELLOWS #75—7" cap.; high speed; late
FELLOWS #7—7" cap.; high speed; late
FELLOWS #715—7" cap.; high speed; late
FELLOWS #712—9½" cap.; high speed; late
FELLOWS 24M Involute Measuring Instrument
GOULD & EBERHARDT No. 8H Univ. Hobber; M.D.
GOULD & EBERHARDT Model 24-H Univ. Hobber; late type
GOULD & EBERHARDT 12H Heavy Univ. Hobber; M.D.
MICHIGAN Model 862-24A Gear Finishing Machine; late
MICHIGAN Model 854 Rack Type Gear Shaver; M.D.
PRATT & WHITNEY 10" Gear Grinder; single wheel type; cap. 10-11/16".

GRINDERS, PLAIN, CYLINDRICAL

CINCINNATI 4"x12" centers Model OH "Filmatic"; new 1950
LANDIS 4"x12" centers; Type H; Hyd., late type
LANDIS 10"x36" centers; Type DC; heavy; Hyd.; late
LANDIS 16"x72" centers; Type DC; heavy; hyd.; late
LANDIS 10"x96" centers; Type C; Hyd.; late type
LANDIS 16"x120" centers; Type B; late type
NORTON 10"x18" centers Type C; Hyd.; late type
NORTON 10"x48" centers Type C; Hyd.; late type
NORTON 14"x72" centers; Type C; late type
NORTON 16"x48" centers; Type C; late type

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GRINDERS, SURFACE

GALLMEYER & LIVINGSTON No. 45; cap. 12"x 24"; late type
HEALD No. 22 Rotary; 12" chuck; M.D.
HEALD No. 25A Rotary; 30" chuck; M.D.
MATTISON 14"x16"x60" High Power "Precision"; Hyd.; late type
NORTON 6"x18" Horiz. spindle; Hyd.; late type
PRATT & WHITNEY 14"x36" Vertical spindle, Hyd.; late type

LATHES

LEBLOND 24"x96" Regal; late type
LEBLOND 24"x84" Regal; late type
LEBLOND 16"x102" heavy duty geared head; late type
LEBLOND 18"x78" heavy duty geared head; late type
MONARCH 10"x20" Model EE; late type

LATHES, TURRET

GISHOLT No. 1L Univ.; Saddle Type; M.D.
GISHOLT No. 2L, Saddle Type; cross sliding turret; M.D.
GISHOLT No. 4 Ram Type; late type
GISHOLT No. 5 Univ. Ram Type; preselector head; late type
JONES & LAMSON #5 Univ. Ram Type; late type
LIBBY (INTERNATIONAL) Model 4H-12 Saddle Type; cross sliding turret; late
MOREY No. 2 Ram Type; late type
MOREY No. 3 Univ. Ram Type; late type
MOREY No. 4 Univ. Ram Type; late type
POTTER & JOHNSTON No. 4D Auto. Chucker; late type
WARNER & SWASEY No. 1 "Electric"; late
WARNER & SWASEY No. 1A Univ.; Saddle Type; late type
WARNER & SWASEY No. 2A Univ.; Saddle Type; late type
WARNER & SWASEY No. 4A Univ.; Saddle Type; late type

MILLERS, PROFILE & DUPLICATING MACHINES

MOREY #12M, 2 spdle. Var. Profiler & Miller; table 14"x18"; late
PRATT & WHITNEY GG "Keller" Auto. Toolroom Machine; table 18"x18" late
PRATT & WHITNEY Model BL-2416 "Keller" Auto. Tracer control Miller; 3-dimensional; 3 spindle; 22"x42"; late

PLANERS

GRAY 48"x48"x10' double housing; 4 heads; D.C.; M.D.
LIBERTY 144"x76"x48' Convertible Openside; 4 heads; vari-voltage; late
NILES BEMENT POND 60"x60"x14'; double housing; 4 heads; D.C.; M.D.
NILES BEMENT POND 72"x72"x30' double housing; 4 heads; vari-voltage; M.D.
SOUTHWARK #1 Horiz. Plate Edge; cap. 1½ x 16'; M.D.

SCREW MACHINES, AUTOMATIC BAR OR CHUCKING

BROWN & SHARPE No. 00G Auto.; cap. ⅜" round; late
CLEVELAND 3¼" Model A single spindle Auto.
CLEVELAND 7¼" Model A single spindle Auto.
CONOMATIC 1⅞" 8-spindle Automatic; late type
CONOMATIC 4⅝" 4-spindle Automatic; late type
NEW BRITAIN GRIDLEY Model 65, 6 spindle Auto. Chucking; late

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Gaging . . .

the Surplus Machinery Market

Don't look for a break soon in the prices of used machine tools. Here's why: we were tipped off by a Chicago dealer some weeks back to keep an eye on the White Sewing Machine Corp-Apex Electrical Mfg Co sale February 6 and 7 in Cleveland. This sale, he said, would be "so big it could set price levels for the next several months at least."

It was. The offering amounted to somewhere near $1 million—and bids ran so high that attending dealers estimated that Apex received 60 to 70c back on every dollar of its original investment on standard machines. And that includes money paid for machines in just fair working condition. Sample bids:

- A Warner & Swasey No. 3 universal 6-speed geared-head turret lathe in good condition brought $4050, complete with bar-feed, air chuck, air cylinders, pan beds, coolant system, a-c motor drive, and pushbutton controls. Cost new in 1943: $3650.
- Another W & S No. 3, vintage 1942, in good working condition, brought $3950. Both of the W & S machines were bought out from under the noses of dealers by shop people.
- A No. 2 Cincinnati tool and cutter grinder that cost about $1500 new in 1939, went for $1800. Not only that, the new owner resold it within the hour for $2000.
- A 15-20-year-old 2-in. RB-6 Acme Gridley 6-spindle automatic screw machine (complete with threading spindle in fifth position, chip conveyor, stock reel, change and feed gears, cams, collets, feed fingers and pushbutton controls) brought $13,500. It cost Apex about $17,800. Three used machinery dealers stayed with the bidding up to the $8,000 mark, then left the field to battling shop owners and superintendents.
- A No. 7 Toledo OBI power press with a 6-in. stroke and a 15-in. shut height, and a 25 x 36 in. bed area with a 4-in. thick bolster plate, equipped with safety devices brought $2,600.
- A No. 20 Bliss OBI flywheel-type power press with 3-in. stroke, 7-in. shut height, 13 x 25 in.-bed, went for $775.
- A No. 47A Heald single-end Borematic brought $1,750.
- A Model 8 Sundstrand automatic production lathe with 21 spindle speeds (62 to 620 rpm), geared head, air chucks and air cylinders—Serial 88-1486—brought $2,500.
- A Model 220 Cleveland rotary rigid hobber with 8-station continuous shifting hob heads, power indexing table, quick - action chucks and individual motor-driven spindles went for only $900 (original cost about $50,000) because it is a special.
- A No. 2A 1620 Pratt & Whitney jig borer with 16 x 32 working surface compound table that cost Apex around $11,000 in 1941, sold for $13,500 to a shop with a spot waiting for it.

Other plant equipment and office equipment sold at levels well below original purchase prices.

These price trends are evident from the representative bids listed above: (1) fair-to-good standard machines are maintaining their sky-high price tags, (2) press prices are staying pretty much in line, (3) special-purpose machines, no matter how elaborate, are still a drug on the market, and (4) junk machines are junk machines and nobody's quite desperate enough to buy them.

But Cleveland-area prices are admittedly somewhat higher than those in most other areas and Cleveland metalworking to date has shown few soft spots. Thus demand for equipment is still high in and around Cleveland, scene of the Apex auction. But give or take a few dollars, the Apex auction has set the price pace for some months to come.

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EVERY TIME!

AUTOMATICS
ACME GRIDLEY RA6 6-SPDL. 1⅜"
B & S 00G—High Speed—Slotting
B & S 00G Screw Threader—Vert. Slide —1950
B & S 2G 1½" Vert. Slide
CLEVELAND Model A 1-1/16" Single Spdl.
NEW BRITAIN #61 6 SPDL. 1⅜"

BOREMATICS
HEALD 48A Single End
HEALD 48 Double End—4 Heads
EXCELLO 2112A Single End

VERTICAL BORING MILLS
BULLARD 24" New Era—3-Jaw Chuck Table
BULLARD 42" — Spiral Drive — 4-Jaw Chuck Table

SURFACE GRINDERS
ABRASIVE 3B 8" x 24" Hor. Auto.
COVEL #20 6 x 18 Hor. Hydr.
DoALL D6 6 x 18 Hor. Hydr.—Selectron —Coolant—1953
NORTON 6 x 18 Hor. Hydr.
NORTON 6 x 18 Vert. Hydr.

ENGINE LATHES
AMERICAN 13" x 30" High Duty 12-Speed
AMERICAN 36" x 60" High Duty 12-Speed
REED-PRENTICE 20" x 78" 16-Speed

PROFILERS
P & W 12B M-1693 2-spdl. Vert.-Col. Raised 12"
P & W M-1482 30" 2-Spdl. Vertical

TURRET LATHES
B & O #2 1" Ram—Bar
B & O #7 2¼" Ram Chucker
GISHOLT #3 1½" Ram—Bar or Chucker
GISHOLT #4 2" Ram—Chucker
GISHOLT #5 2½" Ram—Bar or Chucker
GISHOLT 2L 3½" Saddle — Taper — Threading
W & S #2 1¼" Ram—El. Bar Feed
W & S #3 1½" Ram—Chucker
W & S #4 2¼" Ram—Bar—Preselect.
W & S #5 2½" Ram—Bar—Preselect.

MILLERS
B & S #2 Light Type Plain
B & S #3B Standard Plain — Vert. Attach.
K & T 3H Vertical—Power Feed to Head

PRODUCTION MILLERS
CINN. 08 Plain
CINN. 08 R & F—1951
CINN. 2-24 Plain
CINN. 4-36 Hydromatic—2-way cycle

PLANERS
GRAY 36 x 36 x 12' Double Housing—1 Rail—2 Side Heads—1942

PLANER MILLERS
INGERSOLL 42 x 42 x 14' Adj. Rail Double Housing — 2 Swivel Side — 2 Swivel Rail Heads—1940

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Shop Supt. all around mechanic in machine and structural, assembling and erection also wide experience in tool and fixture design and production and cost control. Will relocate. PW-3959, American Machinist.

Tool Engineer — Acme school graduate — ten years experience—seeks supervisory position—Midwest preferred. PW-4495, American Machinist.

Shop Supt. experienced in all phases of running small manufacturing plant. Age 38. PW4474, American Machinist.

Production Engineer, 42, 20 years experience all phases tool engineering, special machine design, cost reduction, shop, supervisory and administration; interested in filling responsible, challenging position where progressive thinking and ability to reduce costs are appreciated. Present location central Conn. Resume on request. PW-4431, American Machinist.

Mechanical engineer, Austrian, single, 28, 7 years experience in developing and construction is looking for an opportunity to start with American company. Please write to Mr. S. Engelberger, Reforime 525, Mexico, D.F.

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Sales Engineer wanted: Industrial products for Northern New Jersey on exclusive basis. Commission basis. RA-4298, American Machinist.

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#100-10	10' x 8 GA.	12' Bed
#150- 8	8' x 5/16"	10' Bed
#150-10	10' x 1/4"	12' Bed
#150-12	12' x 3/16"	14' Bed

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- 5" Conomatic 4 spindle auto screw machine '44
- No. 2 Cincinnati Centerless Grinder Filmatic Bearings
- 4" x 12" Model H Landis plain cylindrical grinder
- 10" x 18" Type C Norton plain cylindrical grinder
- 14" x 36" Pratt & Whitney hydraulic vertical spindle surface grinder
- 6" x 72" Thompson round broach grinder
- 10" Pratt & Whitney single wheel hydraulic gear grinder
- No. 5 Gisholt universal ram turret lathe
- 3" bar Universal Tri-way horizontal boring mill
- 4" bar Universal Tri-way horizontal boring mill
- 36" Rockford openside universal mechanical shaper-planer
- Model 25 Williams & White 100 ton capacity bulldozer
- 10 ton 66" stroke Oilgear type XD20-66 double vertical broach

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24" x 12' BOYE & EMMES Grd. Head, Timken Bearing, Taper Attachment.

4 DE POTTER & JOHNSTON Automatic Turret Lathe, Late Type.

24", 36" BULLARD Vertical Turret Lathe, Turret Hd., Side Hd., M.D.

No. 2, 3, 4, 6 WARNER & SWASEY Univ. Turret Lathes, Bar Feed.

No. 7 BARDONS & OLIVER Universal Turret Lathes, Preselector, Bar & Chucking, Late

17" x 8' LoBlond Regal Grd. Hd. Lathe, M.D.

No. 1L GISHOLT Univ. Turret Lathe, Cross Sliding Turret, M.D.

DRILLING MACHINES

28" BARNES Upright Drill Press No. 242 M.D. Box Column, Power Feed.

3', 5', 6' CINCINNATI BICKFORD Radial.

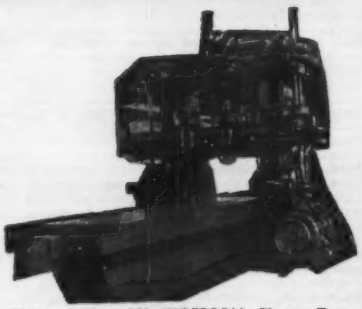
No. 2 M. T. Six Spindle ALLEN Type KH Drill Press. Individual Motor Drive. Late Type

MILLS

0-P CINCINNATI Horizontal & Vertical Prod. Mills, M.D.

No. 2HL KEARNEY & TRECKER Horiz. Mill, M.D., Late Type.

6 Spindle LELAND GIFFORD No. 2LMS-20" Drill Press. Excellent Condition.



42" x 36" x 12' INGERSOLL Planer Type Mill, two heads on rail, two side heads, M.D.

No. 2 BROWN & SHARPE Vert. Mill, Light Type, Swivel Head, M.D. Late

48" CINCINNATI Duplex Automatic Prod. Mill, M.D.

No. 2, 3, 4, 5 CINCINNATI Hi Power Horiz. Mills, M.D.

PRESSES

No. 6 BLISS Straight Side Press Double Crank 135 Tons Cap., Motor Driven.

400 Tons CHAMBERSBURG Hydraulic Wheel Press, 14" Ram, 96" between Tie Bars, 12' to End Support, M.D

3W WATERBURY FARREL Hi-Speed Blanking, 60 Tons Cap., 1½" Stroke, Reeves Drive.

GRINDERS

No. 13 BROWN & SHARPE Universal Tool & Cutter Grinder.

6" x 18" NORTON Hydraulic Horizontal Surface Grinder, Permanent Magnetic Chuck, Coolant System, Late Type.

6" x 10" x 48" NORTON Hyd. Horiz. Surf. Grinder, M.D.

4T SELLERS Tool Grinder, MD. Late Type.

30" INGERSOLL Face Mill Cutter Grinder, M.D. Late Type.

6" x 18" LANDIS Type "C" M.D. Hyd., Cylindrical Grinder, Serial #29196.

MISCELLANEOUS

18 KW SCIENTIFIC ELECTRIC Induction Heater, Tube Type.

No. 8LS FELLOWS M.D. Gear Lapping Machine, Detachable Head, Univ. Work Support.

1AA, 3A, 4A, 5½B, 7B ROCHESTER High Speed Rivetting Hammers & Staking Machines

No. 00G BROWN & SHARPE High Speed Automatic Screw Machine, M.D. Late Type.

No. 6 BROWN & SHARPE Automatic Screw Machine, M.D., 2" Capacity.

8' x 18 Ga Wysong & Miles Foot Shear, Late

No. 194 BARNES Vertical Hone, 4" Capacity, 12" Stroke, M.D.

12" PRATT & WHITNEY Vertical Shaper, Keller Attachment, Late Type.

8" CLEVELAND Model A Automatic Screw Machine, Late Type.

No. 9 MARVEL Heavy-Duty Hack Saw 10" x 10' Cap. M.D. Late Type.

MP-3C S1P Swiss Jig Borer, 15" x 20⅝" table, Excellent condition, A.C. Motor Drive.

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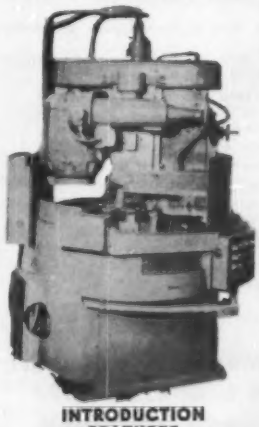

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- Unique Grinder Design with Reduced Maintenance.

Can use either Magnetic chucks or Rotary Fixture Tables.

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#707—12"	#710—18"
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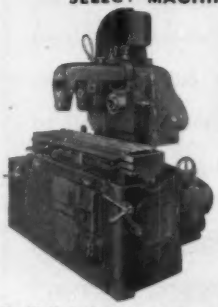

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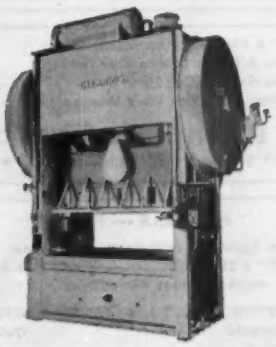

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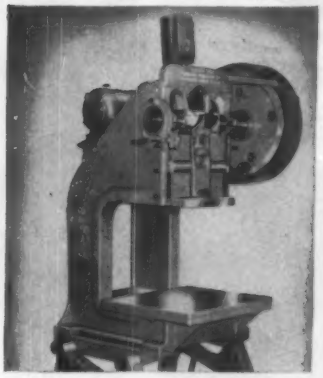

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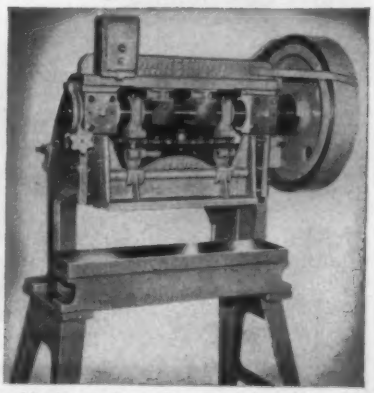

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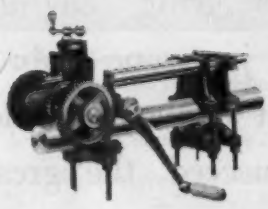

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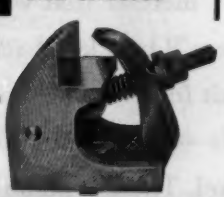

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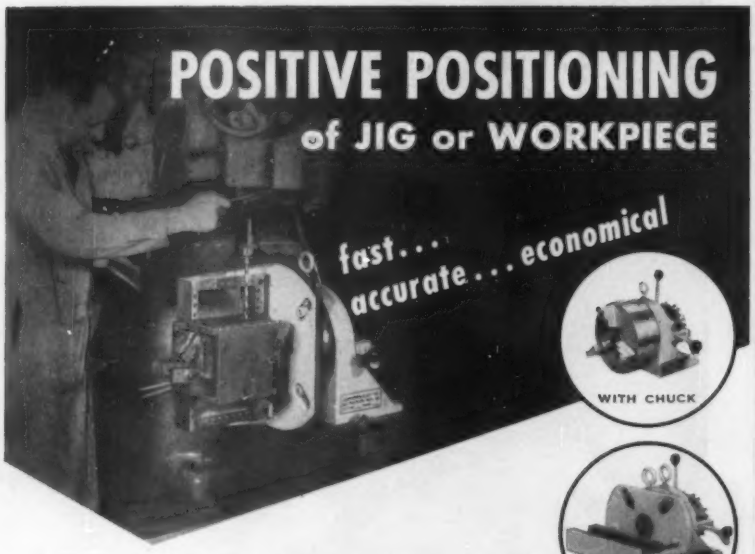

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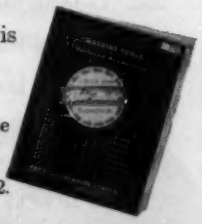

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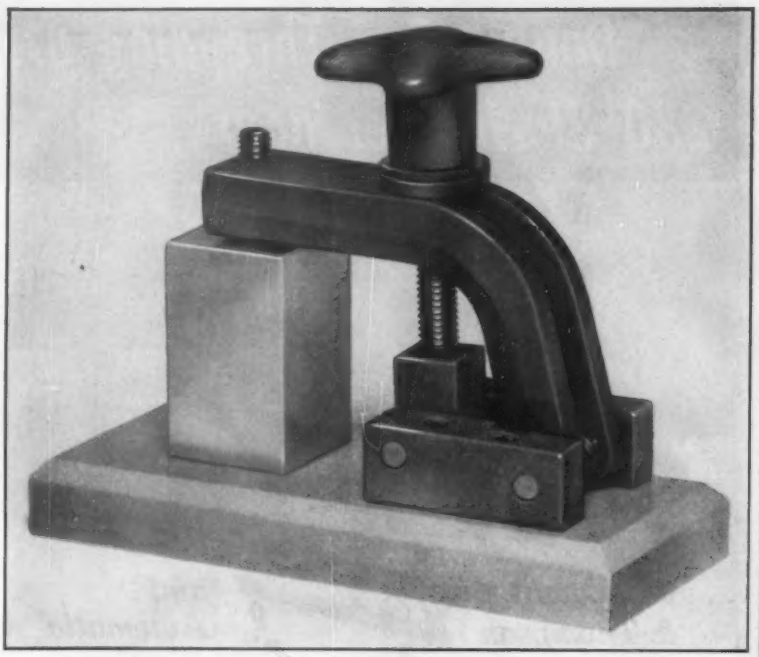

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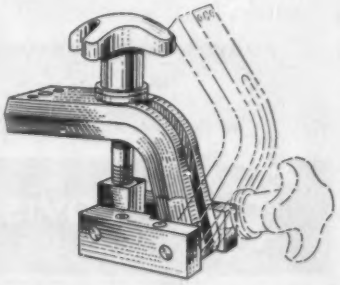

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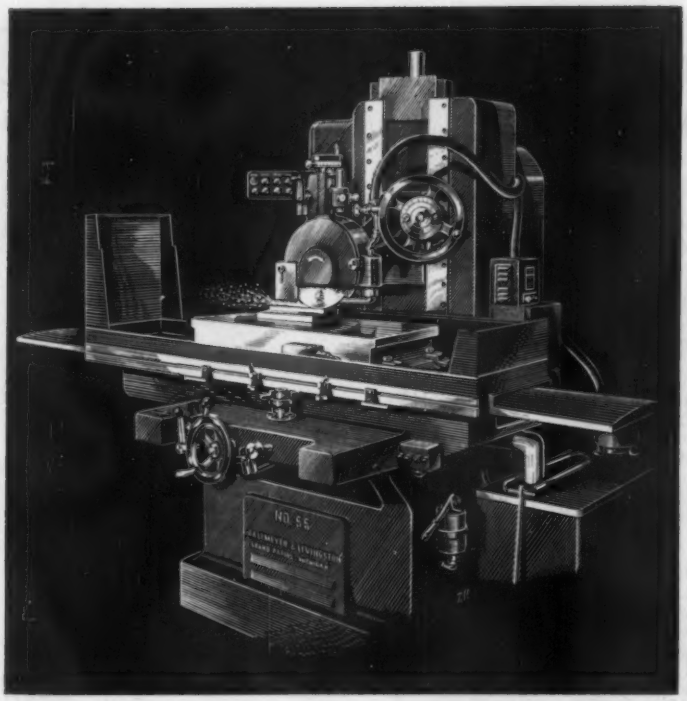

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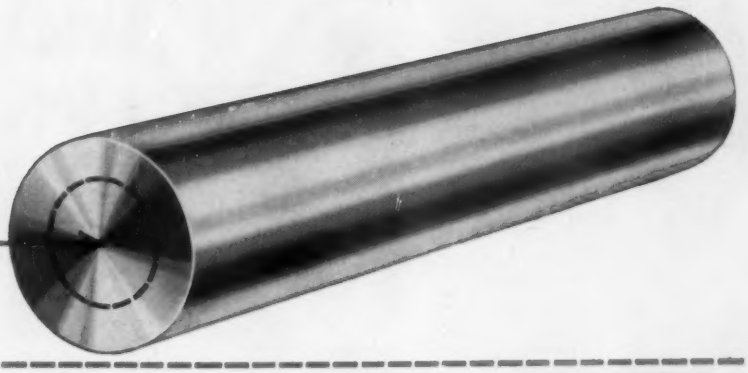

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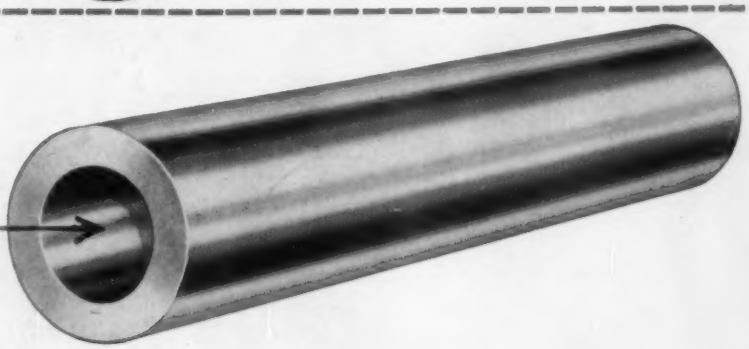

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